

The AUTOMOBILE

New Car Models Seen at the Palace Show

Body Designs Show New Trends—Large Exhibit of Small Cars—Mercer, Chalmers, Owen and Dort Display New Models — Many Electric Starters

NEW YORK CITY, Jan. 4—Continuing the practice inaugurated a year ago the four-floor show at Grand Central Palace once more exhibits progress of the automobile industry to the public of New York City and to the visitors interested in the industry, from all over the United States and Europe. With 317 exhibitors of cars, accessories and motorcycles, this show, in spite of a year in which it is generally acknowledged that the business conditions of the country have not been so good as desired, stands as the highest evidence of a year of prosperity and an optimistic lookout for the automobile industry.

221 Gasoline Cars—15 Electrics

The statistics of the show tell us that there are 221 gasoline passenger cars on the floor, 105 of these are sixes, ninety-six are poppet-valve fours, ten are sleeve-valve fours, eight are eights, two are crescent-valve sixes and one is a sleeve-valve six.

Touring bodies are far in the lead, being shown on 123 chassis. Roadsters are forty-eight in number and forty-five are with miscellaneous inclosed types of bodies. Of the closed types the limousine is in the lead with eighteen.

There are fifteen electric exhibits, nine of which are broughams and three roadsters. Besides these there is an example of a limousine, a cabriolet and a coupé.

Many makers are exhibiting the engineering and design features of their cars by employing a stripped chassis for the purpose. There are twenty-six sixes, twenty fours, four four-cylinder sleeve-valve motors and one eight. This is a larger number of stripped chassis than ever before exhibited.

The setting for the show is one that provides a suitable background for the variously colored cars. The interior of the Palace is arranged to represent a Persian palace with a decorative scheme in white, gold and crimson. This season, while the cheaper cars are of a dark color as a rule, those in the intermediate and higher price classes have a greater

individuality. Royal blue, Brewster green, various yellows and reds are more strongly in evidence than they were a year ago.

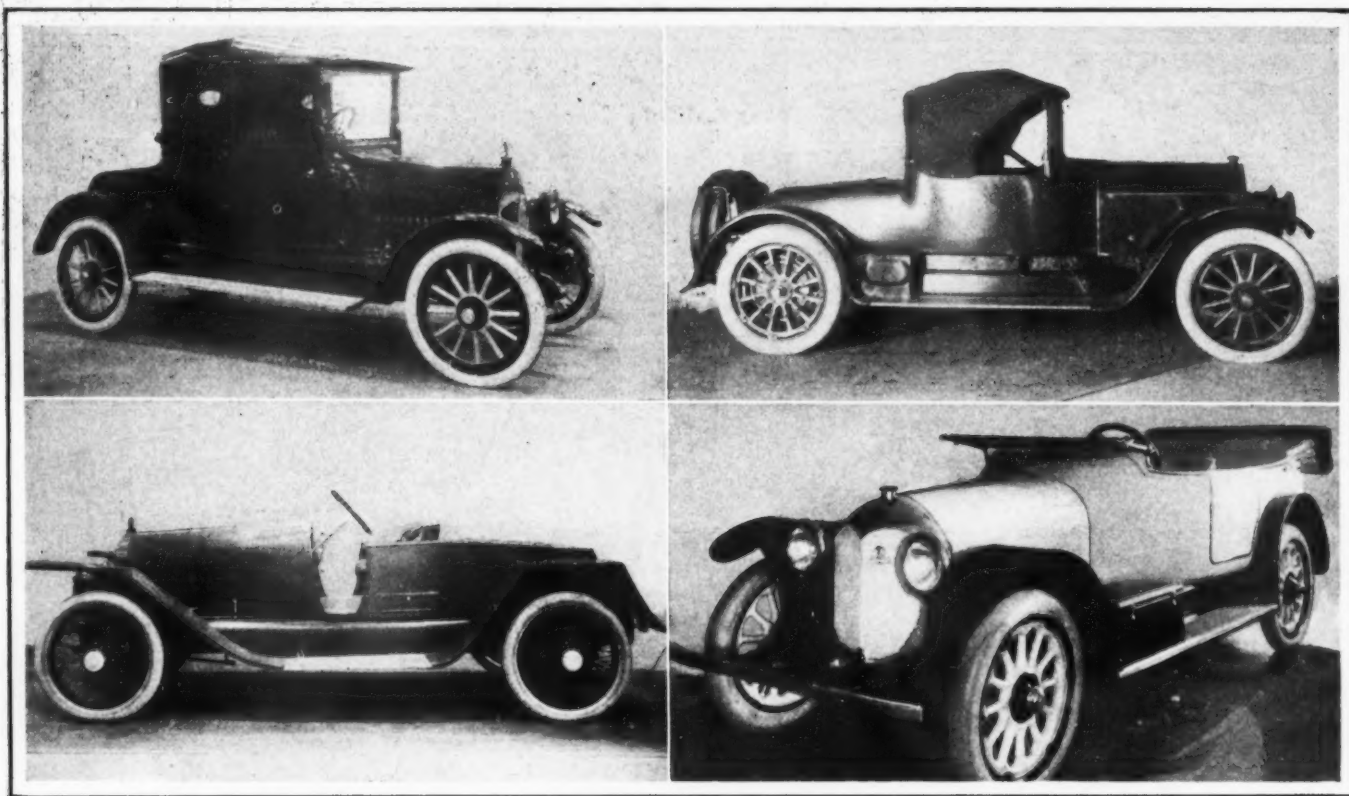
As usual many manufacturers awaited the show time to make important announcements regarding the new models, reductions in prices, additions of new body types and departures from previous practices in their stock lines. Beside these, concerns that had announced cars shortly before the show exhibited these models, in several instances for the first time.

Six Have New Cars

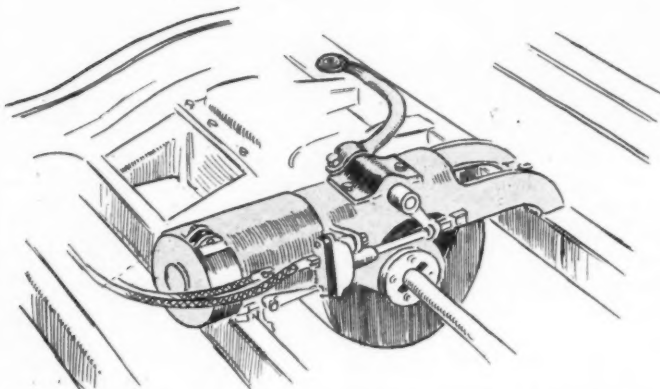
The cars, which had not previously been announced, but which were announced and shown at the exposition are the Mercers, Lexington, Dort, Malcolm, Jackson and Remington. The last named, an eight, was one of the surprises of the show. In addition to these cars, which were shown for the first time at the exhibition of which details have previously been mentioned, are the new Chevrolet \$490, the Chalmers overhead six, which is one of the show features, and the Briggs-Detroit eight.

In addition to these, there are several others who show cars which incorporate several changes. The National is one of these, having made a number of alterations, which really constitute the inauguration of a new model. Paige and Auburn have reduced prices. Paige has reduced the price on model 36, a four-cylinder 1914 model, from \$1,195 to \$1,075.

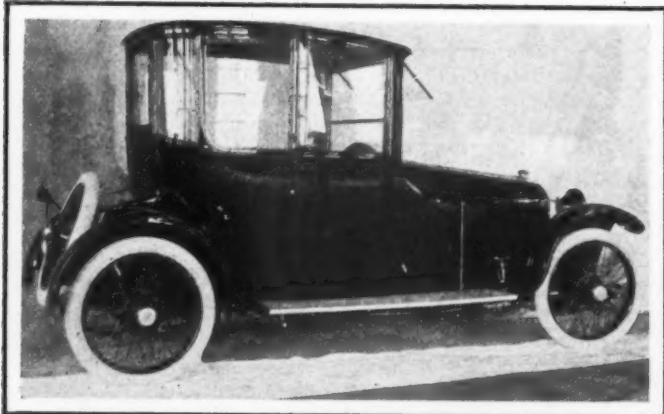
The Kissel 6-42 which was announced not long ago also had its price given at the show. This car sells with a one-compartment two-door body at \$1,650. It is a new design with a 126-inch wheelbase having a block-cast, L-head, 3.625 by 5.5 motor, cone clutch, three-speed gearset and 35 by 4.5 tires. It is unique in that it is supplied with a detachable sedan top at the inclusive price of \$2,000. This was one of the examples of an all-year-round car which can be converted from an open to a closed design by simply adding



Some of the new body designs at the show. Upper left—Jeffery cabriolet. Upper right—Fiat smooth finish streamline roadster with top. Lower left—Cole Cubist roadster. Lower right—Pathfinder streamline touring car



Reo mounts the starter at the front of the gearbox. It drives the engine through worm gearing and the clutch must be engaged when cranking as the starter drive is behind the clutch. The starting switch is mounted directly on the side of the motor casing and is operated by pedal which also meshes the gears



New Scripps-Booth coupé, giving an idea of inclosed small car possibilities

the detachable sedan top, which fits over the single compartment body. This is a stock job entirely and when used as a touring car presents the appearance of an up-to-date, divided-front-seat design. When used as a sedan only close inspection would reveal the fact that the top is detachable.

New Body Designs

New broughams are shown by Locomobile and Oakland. The Locomobile is a special Brewster-built job for show purposes only and is not listed as a stock price. The Oakland is a new development that will be kept as a standard job. It is characterized as an open-front brougham and sells at \$2,500.

Peerless shows a roadster, which has something new in the way of roadster seating, in that they are so arranged that the driver sits slightly ahead of the other two passengers on the transverse seat similar to the arrangement generally adopted in coupés and other inclosed cars. Back of the advanced seat of the driver is a package compartment.

The divided front seat is rapidly gaining and at the show is seen on several stock bodies for the first time. Among these are Kissel, Winton, Cole, National, Pathfinder, Premier and Westcott. The aisle between the front seats is sufficiently large to permit an adult to pass from the tonneau to the front compartment.

Double Cowl Gains

A feature, which has hitherto been a characteristic of custom-made and imported bodies, is the double cowl. It is now seen on such bodies as White, McFarlan and Lewis. The double cowl varies all the way from a fully developed polished cowl-board extending back in the tonneau to a small suggestion of a cowl made by forming the back of the front seat to taper off into an extension. The five-passenger Stearns has only a suggestion of the double cowl, formed by the moulded back of the front seats.

The Moon company has altered the body styles both in the seven-passenger touring and the roadster. In the roadster the appearance has been altered considerably by the use of a

rear deck with a small door accessible from the seats through which the baggage can be placed in the compartment beneath the deck.

The R. M. Owen magnetic transmission car is shown in its completed form. The car uses an improved Weidely valve-in-the-head motor in which the principal change is in the method of driving the overhead camshaft. The drive is now taken from the front end of the motor to the center on a horizontal shaft in the crankcase in the same manner as the crankshaft. From this point it is taken vertically upward by spiral gears. The crankshaft has been stiffened to eliminate vibrating within the range of practical motor speed. The car is now equipped with vacuum-gravity gasoline feed. The Zenith carburetor bolts directly to an extended portion of the intake manifold which is integral with the block cylinder casting. The price, \$3,750, is for either three-passenger or roadster. The motor is a six with 3.75 by 5.5 cylinders. The aluminum housing for the electrical system of transmission is bolted to the crankcase.

Boat-Line Bodies

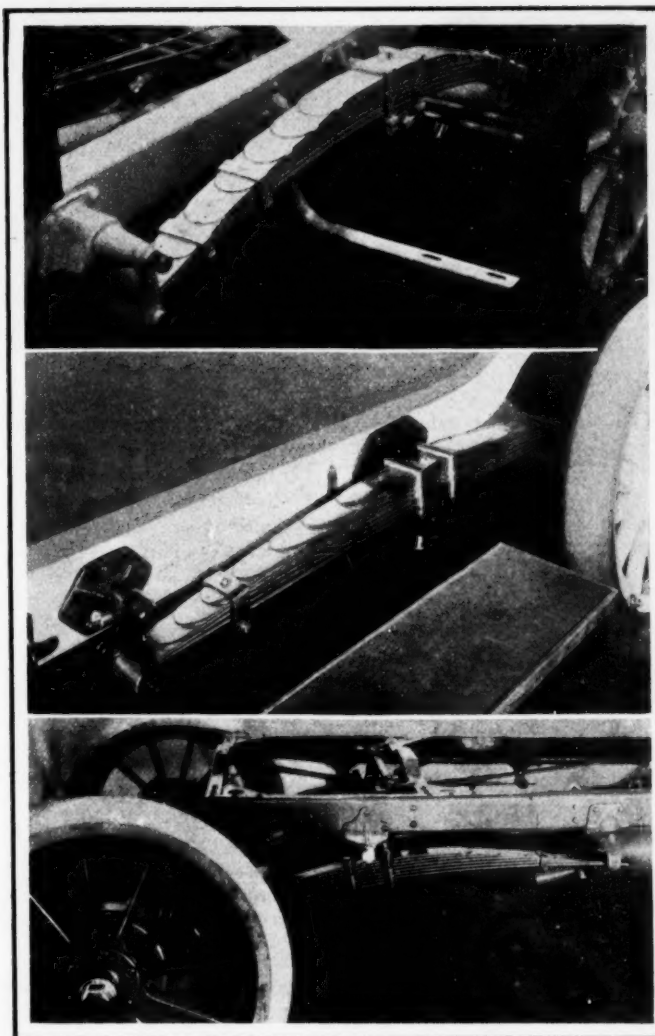
Westcott had some new bodies which show a tendency towards the adoption of the boat-lines. Three touring cars have sheered lines along the top of the body which, in connection with divided front seats, give the bodies a launch-like appearance.

Another concern which shows distinctive bodies is the Lewis. They are copies of the Sunbeam bodies produced in England. A sedan, which is in a deep canary yellow with red doors and trimmings, is one of the conspicuous exhibits at the Palace.

Maxwell has added a cabriolet, which should make a desirable low-priced physician's car. It is roomy and with the top down makes a roadster design with all the advantages of the straight roadster type. The seat is 45 inches wide and 22 inches deep. Ample leg room is provided, as the front of the dash to the heel-board measures 30 inches. Plenty of head room is also provided, the height from the top of the cushion to the inside of the top being 40 inches. The doors are 25 inches wide. Entrance can be had from either side and for convenience there is a rear deck compartment measuring 34 by 40 inches inside with a 10 by 32-inch door in the rear.

Small Car Progress

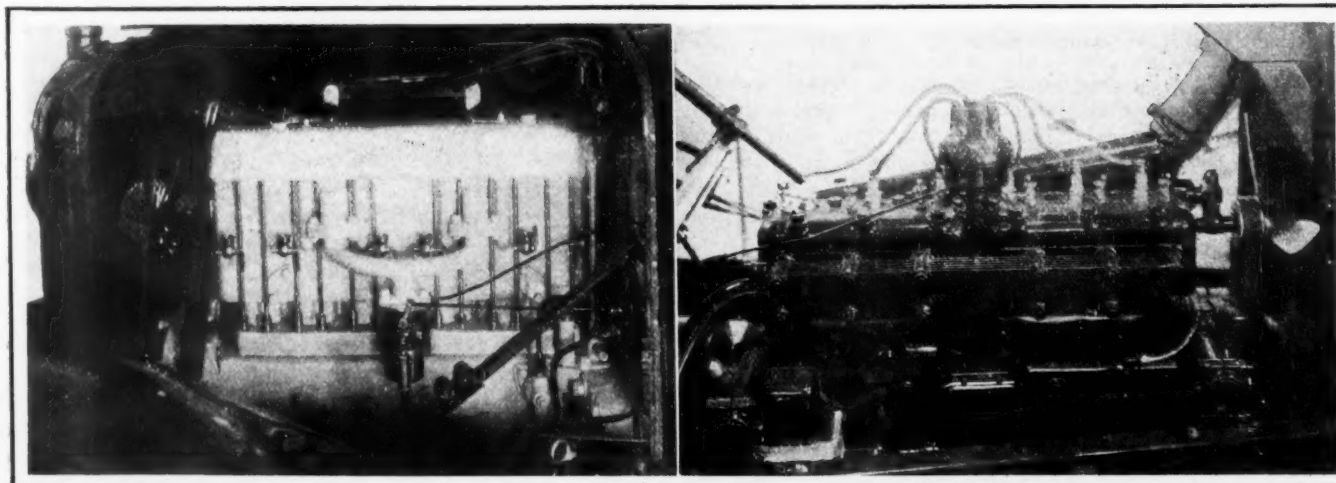
Scripps-Booth shows a closed job that is a revelation in what can be on a small car chassis. It is a coupé with a capacity for three passengers, and staggered seats. The driver sits in advance of the passenger on his right and the third passenger sits on a seat which folds back under the cowl. The car is well illuminated on the interior with four lights.



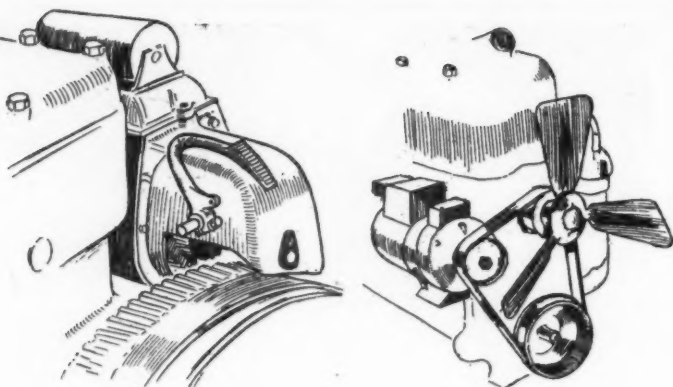
Three types of cantilever rear spring. That at the top is used on the Case, the center one by the Pilot and that at the bottom is found on the new Dort

There is one beneath the cowl which throws light on the pedals and control instruments and another on the instrument board which does the work of the usual cowl board lamp. Besides these there are two dome lights in the rear corners.

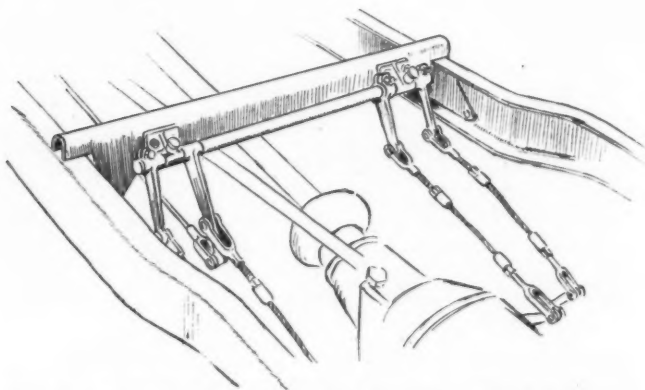
Metz shows the new touring car on which production has just started. It is a five-passenger job with all the charac-



Left—Intake side of block motor used on the six-cylinder Grant showing enclosed overhead valves. Right—Exhaust side of new Saxon six motor showing the exhaust manifold bolted on cylinder block. Note distributor mounting



Left—Mounting of Delco starter on Cartercar. Right—Belt drive of Bosch-Rushmore generator and fan on Regal



Short brake cables on new Reo six. Note the method of supporting the brake mechanism on the U-shaped cross-member

teristics of Metz design except that the dimensions throughout are greater to take care of the larger body. This marks the debut of this Waltham concern in the touring-car field.

Trumbull is another of the new small fours that has a closed body, which is an open-front coupé with wire wheels, and is one of the few closed cars on a narrow tread, 44 inches.

Twombly shows a new two-passenger roadster at \$660. It is mounted on the standard Twombly chassis. The car is unique for its six-point spring suspension gained by continuous cantilevers on each side.

Gadabout exhibits a runabout with a basket body, on a four-cylinder chassis with a 2.5 by 3.5 power plant having L split-head cylinders. It uses the gearless clutch differential in the hub of the wheels. The body is of reed on a hardwood frame. It sells for \$400 with electric lighting.

Electric Systems Accessory Feature

Starting and lighting equipment is the most interesting feature of the accessory division. Some new makes and many new models are on exhibition. On the whole the new machines are better looking, lighter, more efficient and have better material and workmanship in them. Improvements have also been made in the voltage regulation. The development in motor-generator design is notable. Gray & Davis, Westinghouse, Leece-Neville, Chicago Electric Specialty Co., are among the makers showing this type of machine for the first time. New models of generators and motors are shown by Gray & Davis, Aplco, Westinghouse, Bosch, Leece-Neville, and Kemco. The latter concern now has a full line of starting and lighting units, a universal system for old cars and a smaller model of this system for Fords. The Hartford Suspension Company is also showing a special Ford system which is unique in that it is a high-speed, two-unit type. The motor runs 8,000 to 10,000 revolutions per minute. This fea-

ture gives lightness, the complete system weighing in the neighborhood of 50 pounds.

New Carbureters

Several new carbureters have been brought out since the last show. These include a new Rayfield G, a Zenith O, Stromberg H and K, all of which have been described in THE AUTOMOBILE. In addition several brand new carbureters are on display. There is a floatless carbureter, known as the M. F. It is light, compact and simple. The Shakespeare is a springless model in which the flow of air and gasoline are controlled by a single floating disk valve. The Parkin carbureter made by the Light Mfg. & Foundry Co. uses a throttle-controlled fuel flow. It also has no springs and but one air inlet. Two new carbureters are shown by the Hamilton Kerosene carbureter company, one is a new kerosene model using a double float chamber and the other is a gasoline carbureter with many jets.

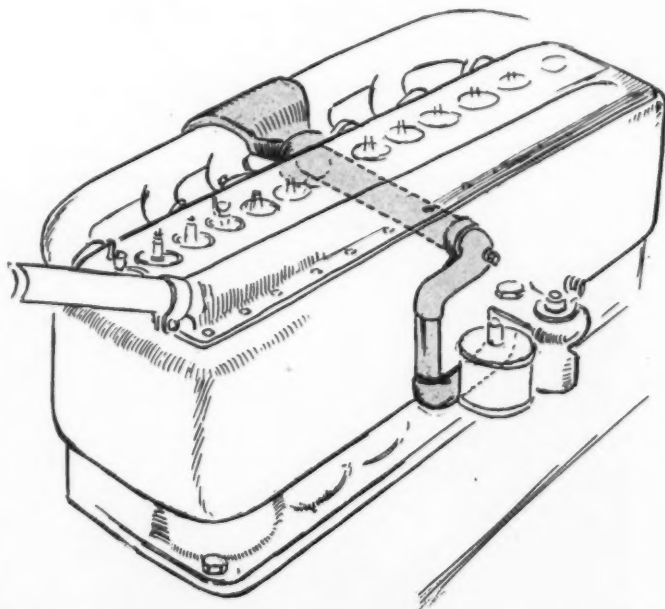
Another carbureter is the Browne which automatically proportions the amount of air to the flow of gasoline by a vacuum-controlled valve.

Refinements and lower prices are noted in the shock absorber field and the speedometer makers show some new combinations, although no radical departures. An interesting accessory shown by the Stewart-Warner company is a self-winding electric clock which runs a year on the energy of one dry cell.

Some new spark plugs are shown but in the main there has been little change. Motor-driven tire pumps are on the increase, the single and two-cylinder pumps being the most numerous.

Monihan General Manager of Marion Co.

INDIANAPOLIS, IND., Jan. 6—J. G. Monihan, recently connected with the Cole company, has been appointed general manager of the newly organized Marion Motor Co., which, together with the Imperial Automobile Co., are the two selling organizations that will market the product of the Mutual Motor Co. recently headed by J. I. Handley. The Marion Motor Co. has paid in capital of \$100,000 and will market the entire new line of Marion cars which will consist of four- and six-cylinder models at popular prices. These models will be exhibited in Chicago during the Coliseum show. It is expected that the Mutual company will take possession of its new manufacturing plant February 1 and in the meantime the production of the new models is being pushed ahead.



Cored hot air passage from exhaust pipe to carburetor in new Velle six motor

Engineering Analyses

Foreign Engineer Applies First Principles to the Car
 Designs at Palace Show—Compares Sixes and Eights
 —Machined Combustion Chambers—Prefers Overhead
 Camshafts—Says Europe Leads in Light Construction

By A. Ludlow Clayden

Member Institute of Automobile Engineers of Great Britain

THE enormous home market which the large and prosperous population of America provides for the American motor car maker has the most profound influence upon the whole trade, because it means that the American car is made to suit the average taste of thousands, whereas the European car can be designed to suit the idiosyncracies of a small section of a smaller population. There is one particular instance of the effect of this difference which may be taken as typical of the whole, and this is that the American public demand an all high-gear car, while the European buyer does not.

Why is this?

The question is not difficult to answer being merely that the European car is commonly driven by a chauffeur or by a mechanical enthusiast who takes an immense pride in his skill of handling. Here in America, where the motor car is bought for its usefulness much as a man purchases an umbrella or a pair of shoes, the average demand must naturally be for the utmost possible simplicity of handling and the type of user who loves mechanisms for the sake of playing with them is in the minority. It has been left for the manufacturers of this country to prove, by their ever increasing trade with Europe, that there are many people there to whom the American proposition appeals, but it is the opinion of the writer that there will always be differences in the average taste of the consumers on opposite sides of the Atlantic. It is this point that he wished to make clear before proceeding to a detailed consideration, and criticism of American design as it appears to him today.

When Power Was King

The first demand of motorists in the early days was for more power, and this demand kept up for many years. Then, as power was given at the cost of increased weight, expense and noise, came the demand for greater refinement and for cheaper vehicles, but, let it be marked, for cheaper vehicles that would also be more satisfactory in use. This called for striving to get smoothness of operation, eliminating excessive vibration, and for simplification of design so as to lower manufacturing cost. The ultimate effect of these demands has been different in Europe and America, for the development of the light high-speed, four-cylinder motor, which is very smooth and quiet, has been Europe's care, while America has tackled the problem by producing inexpensive sixes.

To make the typical European four-cylinder chassis is now

almost as cheap as to make the American light six, quantity for quantity, but the development of the former called for an exaggerated carefulness of workmanship and even much hand fitting, while the six obtained something the same effect at the cost of improved machining facilities. The American, having big quantities to consider, could not have undertaken the kind of work which the European makers did from 1909 to 1912, while the European, not having the quantities, could not have followed the American plan. This means that one cannot very well make direct comparison between the American typical car and the typical European.

Speaking quite broadly their tendency is to grow more and more alike, and this trend doubtless will be obvious for many years to come; but there must always be some differences in the buyers' requirements just as there are still quite big differences in the automobile taste of the French, the Germans, the British and the Italians.

Unprecedented American Progress

Taking the American car as an engineering product, and without any reference to the practice of other countries, it has improved almost out of recognition since the summer of 1911, which is equivalent to saying that the most prodigious strides have been made since 1912, because it was the 1912 models that were going through the shops in the summer of 1911. The most impressive change is in the general tidying up of the chassis, the agglomeration of once separate parts into symmetrical wholes. In this Italy led the whole world; in fact, Italy has sometimes gone too far, and France and England were close seconds. Today America can show some chassis which almost outdo the Italian, and many which are equal in neatness to the most advanced British practice.

Favors Block Cylinders

On first principles this neatness of outline is to be commended because of two machines which do the same work that with fewer parts is almost always the better, though fewness of individual parts does not necessarily mean greater simplicity. For instance, the block-cast cylinder, with six bores

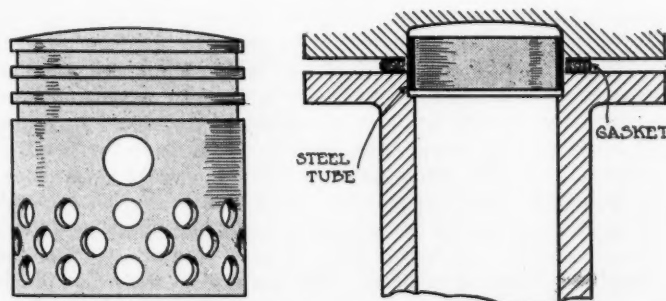


Fig. 1—Left—Piston drilled to reduce weight and to prevent smoking. Fig. 2—Right—Illustrating the use of a ring of steel tube to protect gasket and also to form a spigot

EDITOR'S NOTE—A. Ludlow Clayden began as a motorist in 1899 and as a motor engineer in 1903. He so gained a wide experience of European conditions and of the types of automobiles arising therefrom. In 1911 he made a first visit to America and attended the summer meeting of the Society of Automobile Engineers at Dayton, O., and visited many of the best known manufacturing plants in the United States. This visit, short though it was, gave him an insight into the great difference between the conditions of automobile service here and in Europe so that, while no doubt still possessing some European bias, he does not share the opinion expressed by some Europeans; namely that a difference in practice is necessarily to the advantage of the Old World.

and a collection of internal passages for gas or water, is vastly more complicated than six plain cylinders with straggling external pipe work: because it requires much more elaborate plant to produce it. But experience shows that expenditure of much money upon and in the foundry enables a better article to be made. The block cylinder has cost incredible sums to bring it to its present state of perfection, and it has been developed because it made a better, and not because it made a cheaper job. The fact that it is cheaper now that we know how to do it is merely a fortunate side issue.

Again, the self-starter makes a better car, but it unquestionably makes a more expensive one; the spiral bevel is dearer but better; the pressed steel axle is not so cheap as the built-up type—and so one could go on. The point is that the American maker has, in the past 3 years, done all sorts of things to make the ideal of cheapness more difficult, and it is therefore all the more to the credit of the purely manufacturing end that cheapness has been none the less obtainable.

Next Is Weight

Indications are not wanting that the next big effort will be made towards reduction of weight, not only in America but in Europe, and it would be very hard to say what effect this striving may have upon the design of the chassis. Perhaps the eight-cylinder is evidence of an impending change in which weight considerations take a part, perhaps it is not; for it is yet early to judge; but it is a fundamental fact that to obtain any new quality in a machine generally calls for profound changes.

Sixes Lead

However, leaving speculations of this sort on one side, the present show is emphatically a six show, and as such is unique in the annals of motoring. That the length of the six-cylinder motor is a little inconvenient is shown in some cases by a tendency to crowd the dashboard and its fittings too close to the end of the block; so much so, sometimes, that there would be grave difficulty in removing the cylinders for scraping, and the general provision of more leg room for the driver and his companion passenger shows that room has been lacking. Also the car with a fairly short wheelbase is more handleable than a longer vehicle, so that anything that can help to keep down the length of the motor is desirable if it does not entail sacrifice of other qualities.

Cost of Sixes and Eights

It is claimed that the eight is as cheap, or cheaper, to build than the six of equal power, and it is possible that this may be true in the long run, but it is certainly not true generally, because far greater changes are needed in machine shop and works equipment to change over from a six to an eight than from a four to a six. Thus the writer is loth to believe in a sudden boom in eights for next year.

It had become imperative to produce something better in performance than the average four of 2 or 3 years ago, and the six was the natural outcome. It is not now by any means imperative to make anything better than the average six so far as smoothness in operation and quietness go. Hence suddenly to drop a type of chassis which engineers are just commencing to get a grip of, and to turn to something new, simply because of its novelty, would be very bad business. If a concern has made only fours it can turn to the development of the eight much more readily than could a manufacturer who already had valuable experience in the construction of sixes. Let it not be forgotten that some years ago there was a pronounced trend towards cars of gigantic size and weight, and that those firms that persisted in their own ideals and went on turning out a sound medium-sized, medium-priced car have reaped the reward due to their consistency.

On the other hand; if it is wise to retain types that have

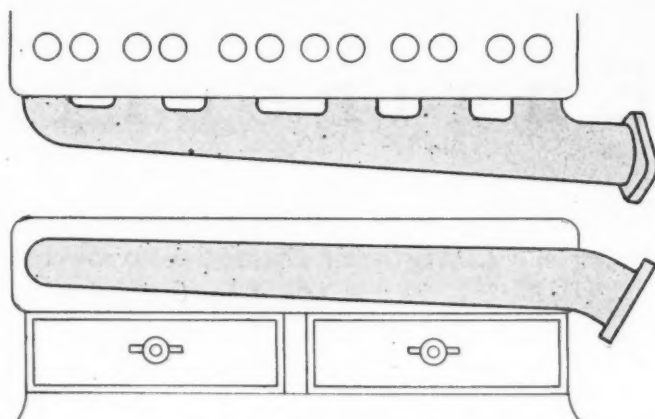


Fig. 3—Top and side views of good exhaust manifold giving clean run for burnt gas

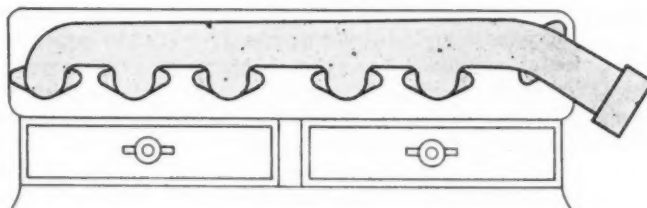


Fig. 4—Common type of exhaust manifold wherein gas has to turn two corners and is thereby baffled

taken the public fancy as the moderate-priced six has done, it is not wise to retain models too long without alteration in detail. There are several examples in the show of chassis which have undergone no redesign for years, but have merely had addition after addition in the matter of fittings and attachments. Such cars may be cheap, but their intricacy cannot but give trouble to their owners and desperate anxiety to the dealers who have to see to their road service. Taking the self-starter as an example one sees many instances where this forms a truly integral part of the motor, but this is usually on new cars of new design throughout. In amalgamating fresh parts with older designs some engineers have been more successful than others, but there are plenty of fine chassis of which the accessibility and the appearance are ruined utterly by a litter of attachments alongside the cylinders.

Accessibility

It is very easy to argue that accessibility is of small importance in these days when cars give so very little trouble, but while this viewpoint may be right enough, it is far too often made the excuse for slovenly engineering design. A quick walk round the Grand Central Palace is proof positive that it is just as easy to incorporate the starter, the tire pump, the water pump and the magneto or distributor so that all are individually accessible, as it is to pile them in a heap so that all the lot has to come down to give proper access to any one.

Also it appears bad practice to fit attachments of this order in such positions that they spoil the accessibility of the valves, because it is certain that valves must one day be ground in, and when that day arrives the job will be quicker and cheaper if the valve springs and the tappets are easy to get at.

Detachable Cylinder Heads

What appears to be an excellent tendency from the owner's point of view is the increase in the number of cars with detachable cylinder heads. Probably their presence on many sixes is due just as much to the greater ease in handling and machining the split casting as to any desire to assist the persons who will have the job of cleaning out the combustion chambers. When detachable heads are used, however, might

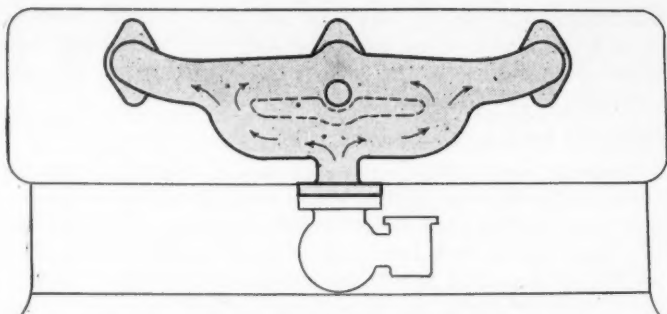


Fig. 5—Intake for six in which distance from carburetor to valve is equal for all valves

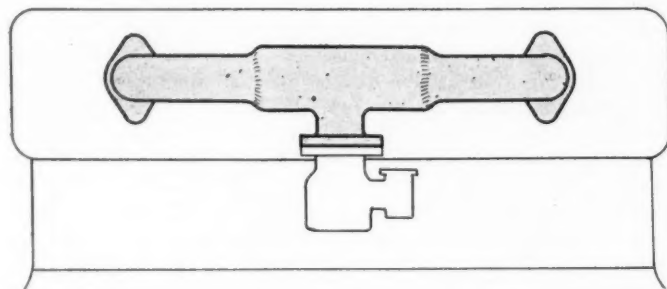


Fig. 6—T-pipe manifold with central waterjacket most used in Europe for sixes

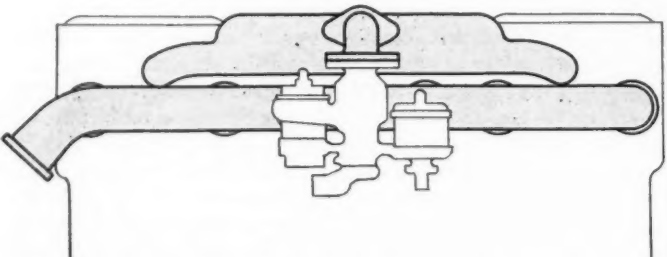


Fig. 7—Intake manifold situated where it is well warmed by exhaust, so assisting power and economy

it not be advisable on all but the very cheapest cars, to provide valve caps in addition; so that valve trouble would not necessitate removal of the head? To detach the head is easy enough in the garage, but it is no job for the roadside, and the cost of the valve caps would be so small that they could easily be given without hurting the manufacturer.

Machined Combustion Chambers

Another point in favor of the detachable head is that it enables the whole of the combustion space to be machined, and so allows of certainty that each combustion space has the same volume exactly. It is an incontestable fact that the Knight engine is far less susceptible to carbon than the ordinary poppet-valve motor, and it has never been settled to what extent this is due to the hemispherical shape of the combustion space and to what extent to the smoothness of all internal surfaces. Also it is claimed that a motor with all-machined cylinders will run more slowly when idle than the ordinary kind. In Europe there have never been enough cars with all-machined heads to enable any of these questions to be answered, but it should soon be possible to settle them in America.

Small Head Gaskets

Yet another idea appertaining to the detachable head is that there seems small reason for doing as a few firms have done and making the jacket cover a separate part: having divided the cylinder block in one horizontal plane, surely that should suffice. The design of one engine also shows that it is possible so to design a detachable head that only plain circular gaskets of two or three sizes are needed to effect the

junction, and as these are less costly and more easy to obtain anywhere, their use is to be commended in preference to the single all-over gasket most commonly employed. The writer has only had experience of detachable head cylinders on cars in which the mean effective pressure was very low, and does not know whether high pressures and temperatures have ever resulted in blowing trouble. If this should have been the case he would like tentatively to put forward the suggestion that the provision of a spigot by dropping in a shallow ring of steel tube would overcome any tendency to leakage while being quite cheap. Fig. 2 shows the idea, which is not, of course, new, as it has been used often enough on other parts to protect and to locate gaskets. There are, of course, detail difficulties in applying the idea to cylinder work, but they should not be impossible to overcome.

Overhead Camshaft Preferred

At almost every automobile show in Europe any time in the past 10 years there has been a fair sprinkling of overhead-valve motors, and here in America the same probably is true. In the present show there are a few very interesting examples. Of the two types of overhead construction, that with the camshaft in the usual place within the crank case and long operating rods has never made much headway, principally because, despite all possible precautions, it is difficult to keep quiet. With the overhead camshaft the construction is generally reckoned as more costly than the usual practice and there have been many troubles with the drive for the camshaft, despite the fact that it looks the simplest thing on paper. Thus in one of the most striking designs of the overhead type in the show the writer observed a most neatly arranged vertical shaft drive with skew gearing of fairly small dimensions. If this is utterly satisfactory it will be a splendid testimonial to the material employed. Of course the touring car engine does not have to stand up to racing stresses, but it is significant that the use of a long train of spur gears for the racing Peugeot camshaft drive was decided upon after the trial and failure of skew and bevel gearing. Some of the first attempts made with gears of these types showed that the thrust set up had been sufficient to heat up the teeth to a point where they bent readily. This means that the power required for camshaft driving is more than is supposed.

Eliminate Valve Cages

Then again there has been much trouble with valve cages, so that there is much to be said in favor of those designs in which the valves seat directly in a detachable head, for in such a case there can be no difficulty in ensuring proper cooling for the seatings.

Yet another trouble with overhead construction for touring car engines is that the greater its length the greater is the durability of a valve spring, and overhead valves are usually short in the stem so as to keep down the height of the motor.

Still, from the accessibility viewpoint as well as on account of the unquestionable advantages of the symmetrical combustion space, the valve-in-head motor is well worth keeping on with, and the enterprise of the sponsors of new endeavors in this direction is commendable.

Europe Leads in Lightness

It seems that this is a year of general tuning up, so that the brake horsepower of the average American motor has increased a good deal, despite the decrease in average rated power. This is shown by the large valves and gas passages now being employed, and in the lightness of reciprocating parts. With respect to the latter there is still possibility of advance, since the average piston and the average connecting rod are heavier than European experience shows that they need be, even supposing that quantity production is considered. This means that the 1915 motor will have a higher mean effective pressure than its predecessor, and the 1916 probably higher still.

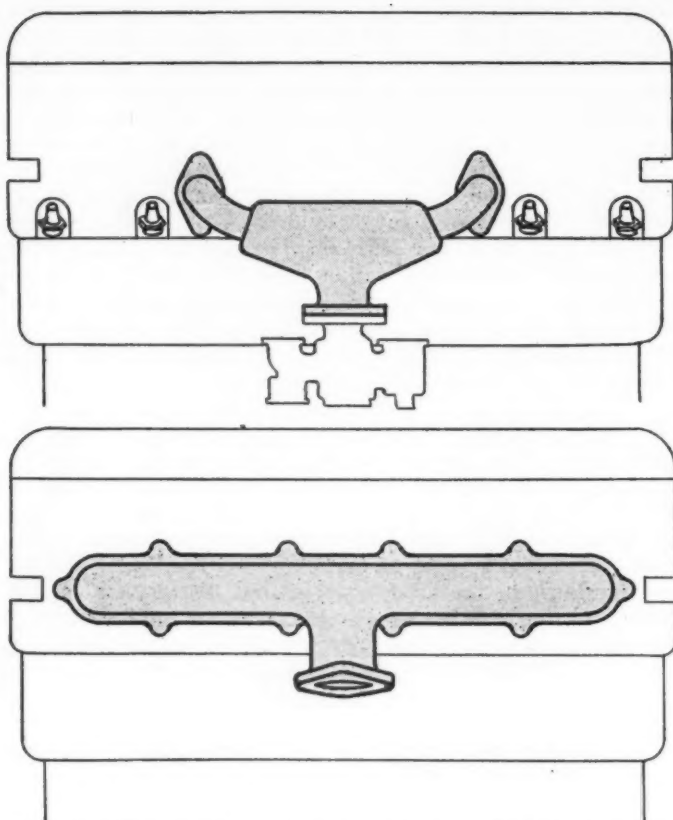


Fig. 8—Another design of Y-pipe intake manifold with bigger waterjacket

Fig. 9—Cover plate to cored passages for intake on I-head motor

Now, all troubles with high power-for-volume motors are due to high pressure, corresponding high temperature and high stresses due to reciprocating parts. Valves are one of the first parts to give trouble, by burning, and no doubt Tungsten steel is going to help. For crankshafts and connecting rods lighter weight and higher stresses call for stronger steel, and THE AUTOMOBILE announced last week that these parts were, on the average, of higher tensile material. The use of such steels means more costly machining as well as a bigger bill for raw material, so that the tuning-up process is going to cost money. That this money is not being grudging is a most healthy sign, and it means that in the happy future, to which we are all looking forward, the American manufacturer will be readier than ever to grasp the enormous foreign trade that will of necessity arise.

More Speed, More Oil

Turning to another detail of motor construction, namely, lubrication, it is to be noticed that pressure-fed oil is being supplied directly to the bearings on a majority of the better class new designs. One must not always reckon from wide averages in this as in other things, because trends are really shown by new work only. Taking an average from all cars one includes many old patterns which pull down the figures, wherefore it is true that fully forced systems of oiling are very greatly on the increase. This is the effect of bigger bearing loads engendered by higher speeds.

For the eight, with its compound lower ends on connecting rods, forced oiling is probably essential, and on all engines its presence spells greater durability for the bearings, but it is usually more difficult to get oil economy than with the splash system. Conversation with one or two exhibitors suggested that European experience in this respect was being borne out here. One fitting which has been part of the Rolls Royce for many years is a throttle for varying the pressure of oil according to the position of the gas throttle, and it has always been a source of wonder that so excellent

and common sense an idea has not had general adoption. It is to be found on at least one American motor now—an eight—and engineers who have trouble with heavy oil consumption might do well to try it.

Clean Oil Filters

However, apart from such refinements, something yet remains to be done to facilitate the cleaning out of oil filters, and to assist the cooling of the oil in circulation. It is the fact that only a very few drivers will ever take the trouble to clean a filter, but is it to be wondered at when the nature of the task of removing that filter is considered? It is possible to make a filter so that it can be extracted without dirtying more than the hands, and without crawling beneath the car. If the oil pump is in the most efficient place—which is actually beneath the oil level and inside the base, then by casting a vertical chamber on the side of the crank case base the filter can be located over the pump and made to withdraw upwards on the removal of a single thumb nut. In such a car the chances of the filter being cleaned are hundreds per cent. greater than where the position even of the filter, may be a matter for search. Rising engine efficiency with rising bearing pressures makes the cleanliness of oil of increasing importance and, as people cannot be trusted to filter oil as it goes in, the effectiveness of the internal filter becomes vital.

Cut Down Oil

No doubt, too, the rise in motor r.p.m. will lead to the complete and final abandonment of the plunger pump in favor of the gear pattern. The appearance of scraper rings at the foot of many pistons shows that the need for keeping oil from excess in the cylinders is being attempted, but the writer has not found an example of the simplest way of scraping the cylinder, namely, the drilling of as great a number of half-inch holes in the piston skirt as it will support. This method has been used in England on racing cars as well as on touring vehicles, with the greatest success, and has the dual advantage of overcoming smoking while reducing reciprocating weight instead of increasing it as does the scraper ring.

It seems that there are sometimes troubles here due to piston slap at low speeds, and it is difficult to see why this should be so unless American tolerances on bores and pistons are very large. Certainly one of the best ways to reduce slap is to cut down piston weight, to increase the weight by making a very long piston is really trying to make a right out of two wrongs.

Wrist Pin Bushings

As to piston pin fixings, in Europe the bushed connecting rod with the pin fixed in the piston is universal, but the American method of reversing this seems to have many advantages. On one engine here the piston is bushed and the rod also, the pin being free to move in whichever it likes, and prevented from sideways motion by slipping a thin piston ring over the ends. This seems a very good idea, and is certainly one to be watched. Probably the securing ring is not necessary as it should suffice to make the pin a trifle short and to drop in a bit of bronze at each end. This was once done with success in England, but the pin was then a tight fit in the piston and not meant to move in it.

Favors Four Bearings

As to the number and proportions of crankshaft bearings it seems that four of good size are the rule on sixes. The writer has previously expressed a preference for seven bearings, but the study of the six in so many different kinds and sizes shows that the advantages all told should rest with the four-bearing construction. In discussing a contribution of the writer's to the S. A. E. talk on the ideal car last summer, Howard E. Coffin said that vibrations in sixes were due more

to torsional oscillations in the shaft than to bending stresses or lack of adequate bearing support. With this view agreement is difficult to one who has studied rotary balance, because the Norton machine makes amply evident the big reactions at the bearings due to the bending distortion of a crank when run light, and without piston masses to aggravate the effect.

Also, it has been found that periodic vibrations in sixes could be cured, or at least raised above the practical range, by increasing the stiffness of the crank case. Now, when the length of the motor is important—and short length reduces torsional deformations in a shaft—it is much easier to give rigid support to the shaft by means of four big bearings than by seven little ones. It is, of course, cheaper, too, so the American practice as it stands today seems right.

Problems of Manifolding

Probably the widest differences in idea on the sixes are shown in the designs used for manifolds. For exhaust gas the best effect is usually obtainable from a separate pipe of which the section increases from front to rear and which stands clear of the block. The integral type calls for a great increase in cooling water and so means weight, while it is impossible to clean it out inside so as to give the gases a clear run. Seen in the horizontal plane the pipe is certainly best when straight, for it is easier to cast, easier to clean, easier

to machine, freer in action and better to look at. It is usually only possible to use a straight pipe like this when the intake is through cored passages in the cylinder, but since it is imperative to keep the intake warm, if carburetion is to be satisfactory, there is everything in favor of the type embodying cored intakes.

Simple Ones Best

Usually it is possible to simplify the casting and to give the incoming gas a path of equal length to each cylinder, if there are two sets of cores in a six block. This means two flanges outside the casting and a branched pipe to the block from the carburetor. In the show there are all sorts of freak designs and in many cases external pipes of such length that considerable condensation must take place within them, greatly interfering with even carburetion; of course the greatest things are always claimed for them, but the writer has seen them nearly all in Europe and has watched nearly every six builder come back to the simpler job.

From the viewpoint of warming the gas thoroughly before it enters the cylinders, from the point of view of carburetor accessibility and from that of valve accessibility also, it is best to put the carburetor on the side of the block opposite to the valves and this is therefore quite rightly the general practice.

(To be Continued)

Overhead Valves Make Ferro Eight Accessible

AN eight-cylinder motor with valves in the head has been brought out by the Ferro Machine & Foundry Co., Cleveland, O.; and it is exhibited at the Biltmore Hotel, New York City. This is the first time this construction has been used in a commercial eight-cylinder motor. Many other interesting features are also noticeable in this machine which is built in two models rated at 45 and 60 horsepower. The former has a 3 by 3.5 bore and stroke and the latter 3.25 by 4.

Except for the difference in size the two engines are identical. Both cylinder blocks and the top half of the crankcase are cast in one piece, the valves being in a detachable head. The rocker mechanism is completely inclosed in caps which are bolted to the heads.

Extreme accessibility has been obtained in this motor by the valve-in-head construction which allows the exhaust pipe to be carried on the outside of the cylinder blocks. The intake manifold also incorporates the water outlet from the cylinders and in this way one pipe is made to do the work of two. The thermo-syphon system is used. Further simplification has been obtained by driving the generator and two-bladed fan by a single 2-inch belt. The starting motor drives through the flywheel. The timer distributor may be any standard make.

Many details of this motor are new. For instance, the cover which incloses the valves is bolted tight so that it is noise-proof and dust-proof and retains the oil. It gives the impression that it is an integral part of the cylinder castings. These coverplates are held by three studs. The valves are operated by pressed steel rocker arms, which are an innovation. These are roughly of channel shape. Another feature is in the pivoting of these rocker arms. Instead of using a pin, a ball-and-socket joint construction is employed. The ball is formed on the end of a stud which is bolted to the valve cover plate and the socket is pressed into the rocker. The studs just mentioned are hollow and are equipped with ball-closed oil holes. Thus the ball joints can be easily oiled through these holes. The studs are adjustable so that the proper clearance between the ends of the rocker arm and the valve stem and push rod can be maintained. The cylinder head is held by eight bolts, four on each side.

A single camshaft with sixteen cams is used. It is driven by a pair of large helical gears direct from the crankshaft. By the use of a cam for each valve, the necessity for the use of valve levers is eliminated. Roller cam followers are used. It is stated

that with the sixteen cam construction this motor is as easy to time as a four and no difficulty should be experienced by repairmen.

The outlet water connection is at the center of the casting on the outside. Exhaust pipes are on the outside of the castings, there being three outlets from each cylinder, individual outlets from the end ones and one outlet for the center cylinders. Pistons are fitted with three rings, two near the top to hold the compression and a larger ring around the wrist pin which has a double function; to retain the wrist pin and to prevent from scoring the cylinders and to hold compression. Connecting-rods are of the forked type, there being one bearing for two connecting-rods. The crankshaft and camshaft are carried on three main bearings of phosphor bronze.

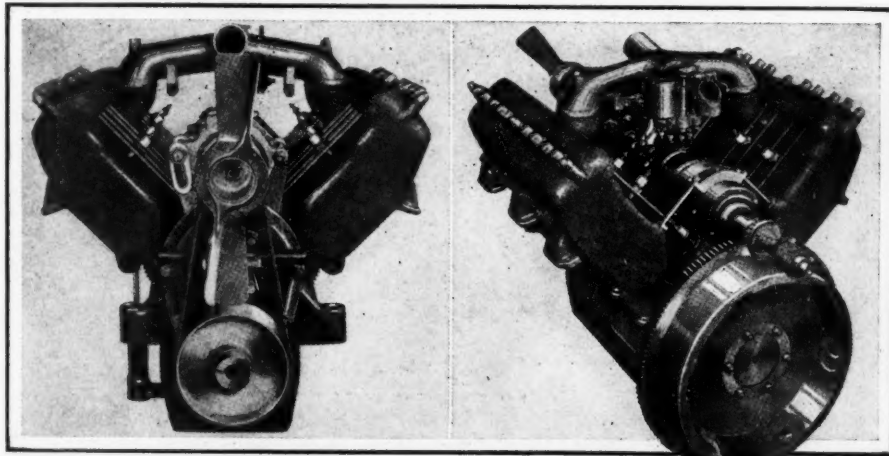
Lubrication is by a force-feed system, there being a gear pump at the front of the motor on the left side which draws oil from the bottom of the crankcase and forces it through four oil leads to the main bearings, whence the oil is distributed from the connecting-rod bearings to drilled leads in the crankshaft. Two insure an even distribution of oil to the four connecting-rod bearings. Four main leads are used. The two leads run to the two end bearings, whence oil is carried to the adjacent connecting-rod bearings. The other two leads go to the center main

bearing, where one lead distributes oil to the second cylinder connecting-rod bearing and the other to the connecting-rod bearing of the third cylinder.

A feature of the generator mounting is the use of an aluminum housing which carries the generator and which allows for belt adjustment. This housing is pivoted at one side and is held by a bolt running in a set on the other side. By loosening this bolt and moving the hole housing the tension of the belt may be changed. Any standard make of generator may be installed and likewise any length of motor may be used. Dimensions:

	60 hp.	45 hp.
Compression volume in per cent. of piston displacement..	31	31
Diameter and length of crankshaft bearings:		
Front	1.75 by 2.75	1 9-16 by 2 5-16
Center	1.75 by 2.5	1 9-16 by 2
Rear	1.75 by 3.25	1 9-16 by 3
Crank pin bearing..	1.75 by 2.25	1 9-16 by 2
Valve diameter ...	1 9-32	1 11-32
Lift	1-4 inch	

The firing order is as follows:
Right 1, left 1, right 3, left 3, right 4, left 4, right 2 and left 2. Connecting rod length is twice that of the stroke.

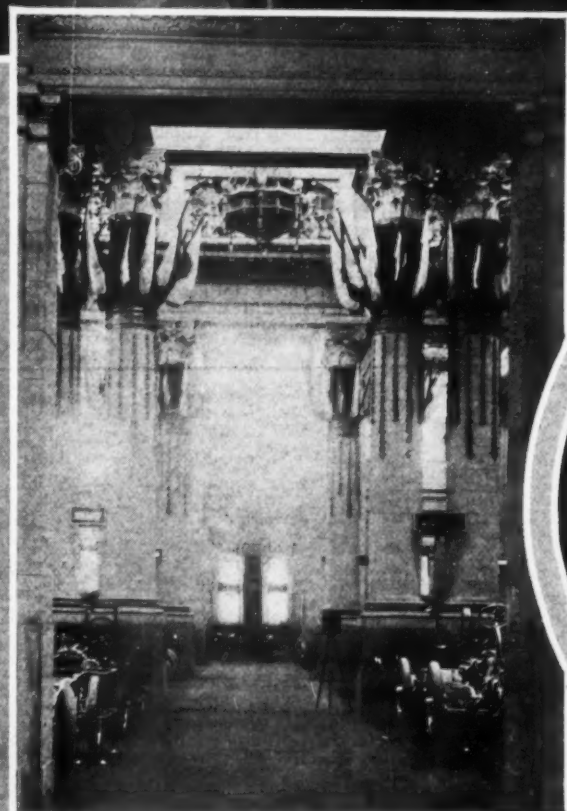


Left—Front of Ferro eight motor. Right—Rear, showing mounting of electric system, distributor and carburetor with combined water outlet and intake manifold for simplicity and water-jacketing. Note inclosed overhead valves, permitting outside exhaust

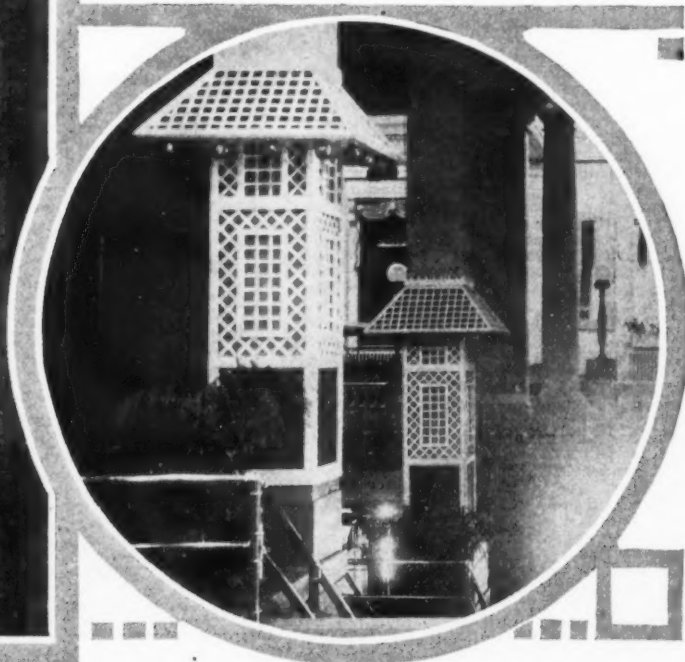
New York Show as a Persian Garden



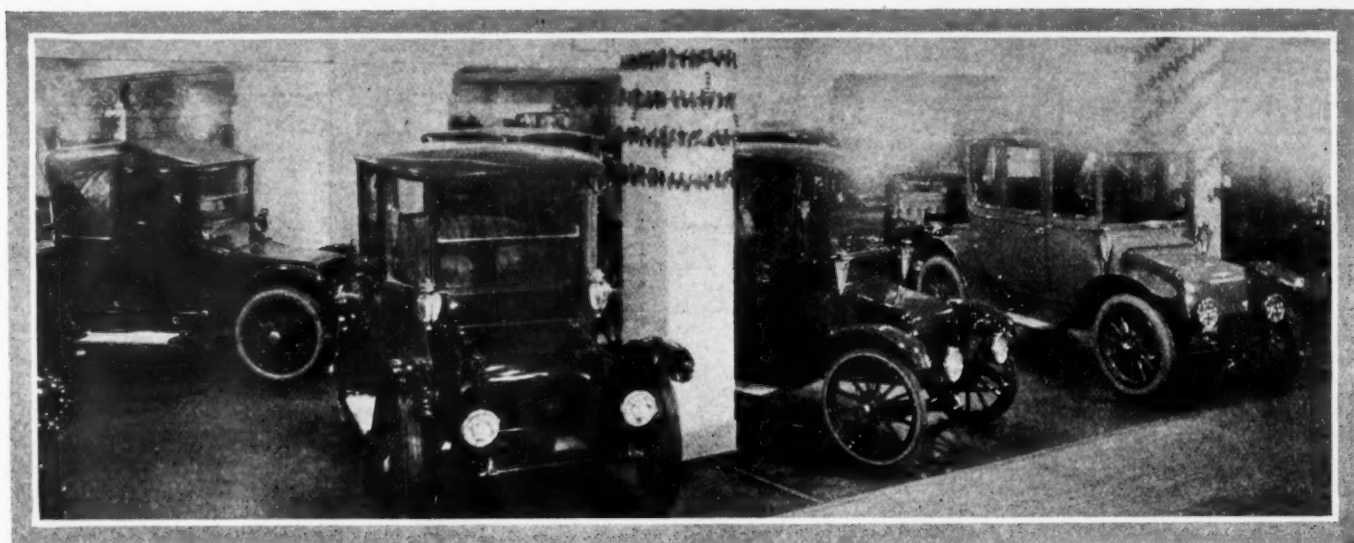
A partial view of the first floor of the Grand Central Palace, showing the arrangement of the cars on display



A glance down the main aisle of the first floor, showing decoration scheme. The dominant colors are white, gold and crimson and the theme is a Persian garden



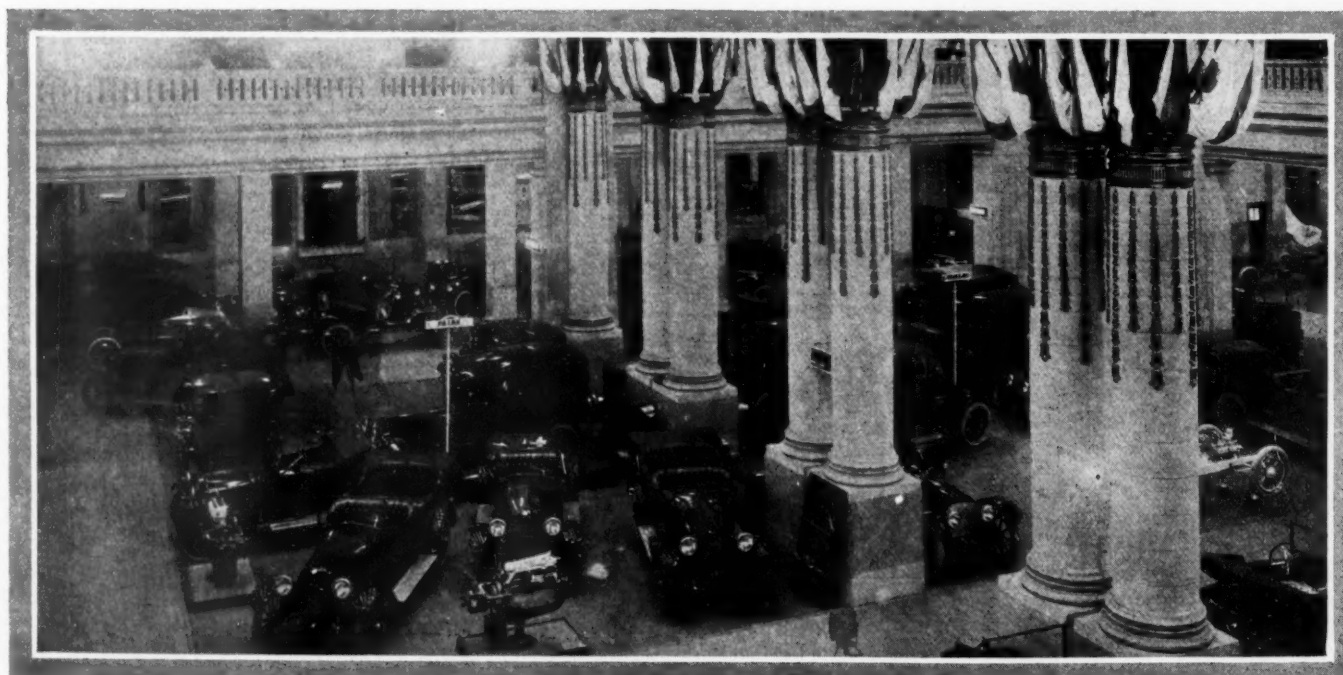
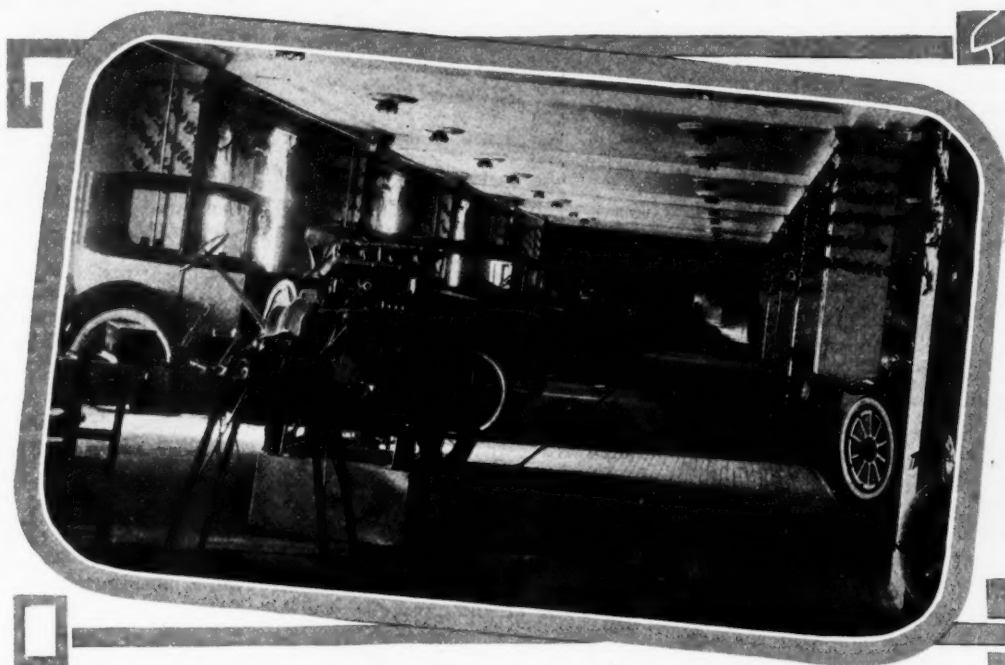
A glimpse of the California garden decorations at the entrance of the first floor. Lattice work, palms, etc., enhance the beauty of the stairway



Above—Some of the electric cars at the show. There are fifteen cars in all, nine broughams, three roadsters, one coupé, one cabriolet and one limousine

Right—One of the aisles on the second floor. Note how the theme of the decoration scheme is continued by the garlanding of the pillars

Below — Looking across the center aisle on the main floor, giving a partial view of Cadillac, Paige, Locomobile and Packard exhibits, with Oakland, Jeffery and Franklin in the background



Eleven New Chassis Seen at Show

In Addition to the Many New Bodies Eight Concerns Show Models for First Time—Remington Brings List of Eight-Cylinder Cars to Four

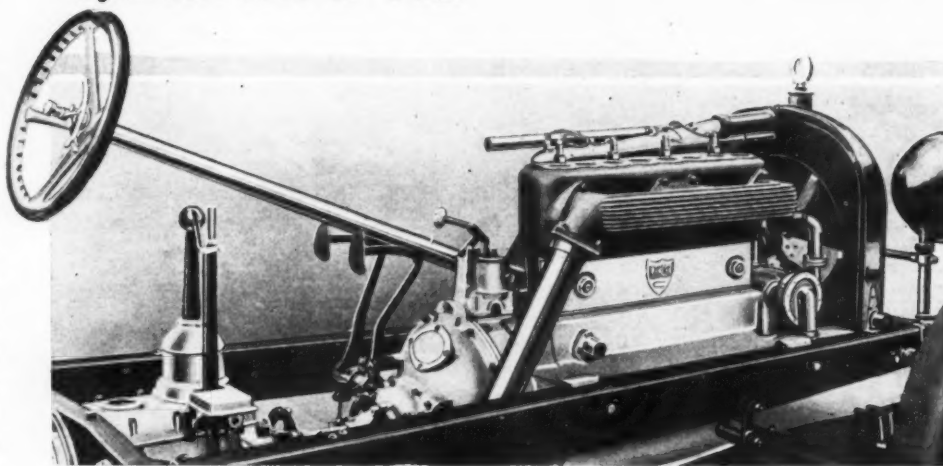
ELEVEN concerns awaited the opening of the show in New York before announcing their new chassis models. Some of these are models that have been expected for the past few weeks but are exhibited now for the first time. Others, however, are showing cars of which no details have heretofore been known. The latter include Mercer, Premier, Malcolm, Remington, Dort, Lexington, Jackson and National. Those cars of which details have been known but which are seen at the New York show for the first time are Chalmers, Chevrolet and Detroit.

Mercer Announces New Series

Mercer waited until the show to announce its new series of models. The new Mercers are entirely different from those of previous seasons with the exception that the policy of building medium-weight high-speed four-cylinder cars is continued. The low lines and high speed for which Mercer has always been noted are also features of the new model, for in the touring car the side line of the body is only 45 inches from the ground and the speed is guaranteed to be 1 mile in 45 seconds or 80 miles an hour.

Four cars, a six-passenger touring, four-passenger sporting, both listed at \$3,000, a runabout at \$2,900 and a race-about at \$2,750 make up the line. These are all mounted on the same chassis with the exception that the wheelbase of the touring and sporting models is 130 inches while the race-about and runabout have 115 inches.

The new motor is of Chief Engineer Delling's design throughout as, in fact, is the entire new chassis. The power plant is a four-cylinder 3.75 by 6.75 L-head block with a piston displacement of 298.2 cubic inches. This gives an

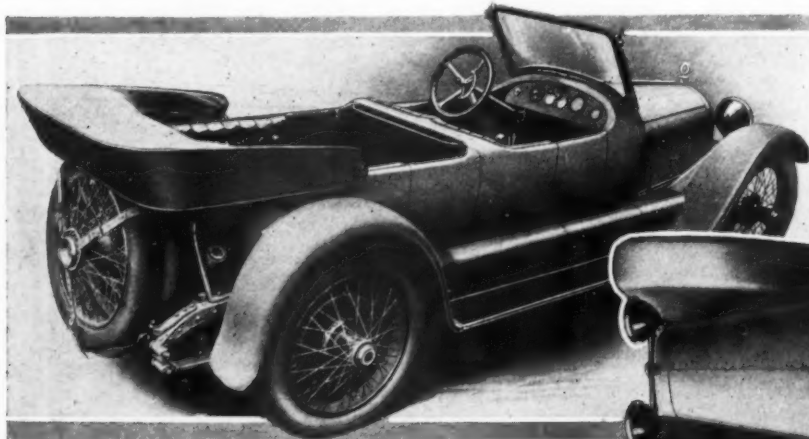


Mercer four-cylinder L-head block power plant, showing left drive and center control. Note steering rake

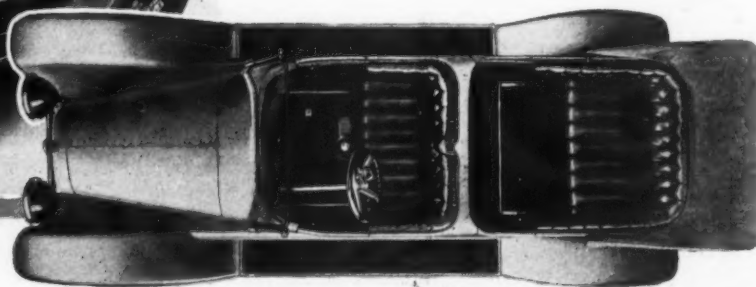
S. A. E. rating of 22 horsepower and the maker's rating is 70 horsepower at 1,800 revolutions per minute. The combination of these two horsepower ratings has given rise to the model name of the series which is known as 22-70.

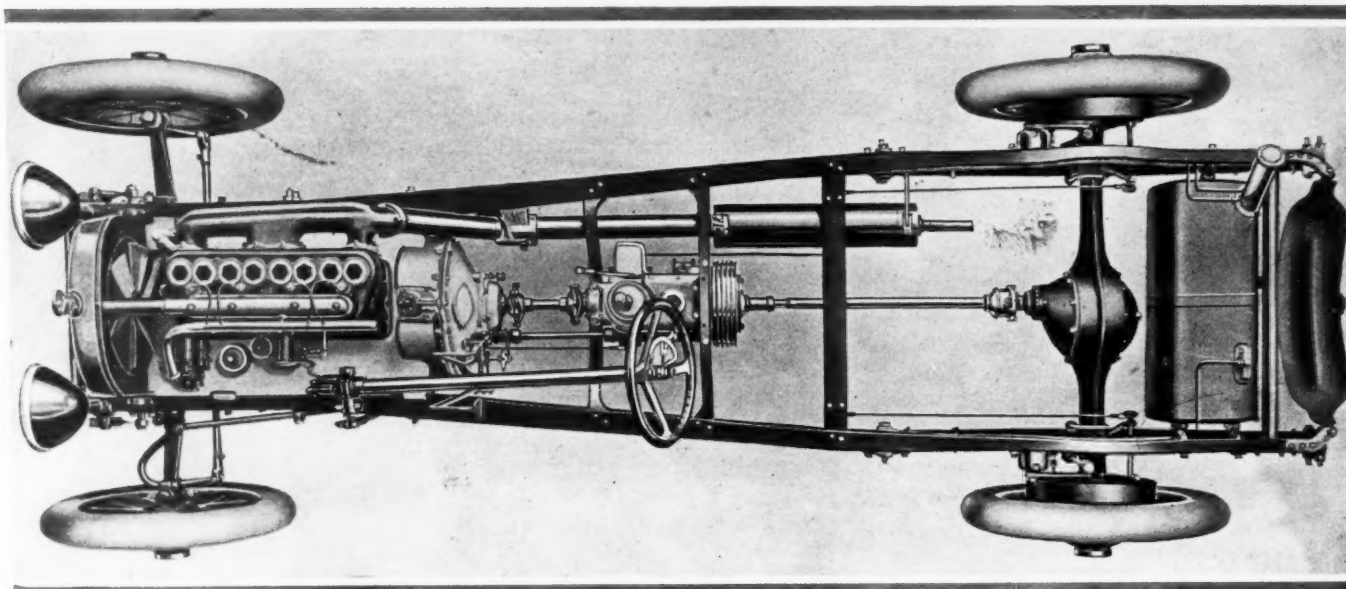
New Mercer features are in evidence throughout the chassis. The valves are on the right side and are inclosed by an aluminum cover plate held in place by two thumb-screws. In connection with the block motor this cover plate gives an effect of simplicity to the exterior. This is heightened by the carbureter being attached directly to the cylinder casting which carries the intake manifold integrally. The magneto and water pump are set at the front of the motor and are driven from a cross-shaft. This arrangement keeps the sides of the motor smooth and clean. A web is cast between the arms of the crankcase, extending out to the frame on each side of the motor, forming a shelf which serves the purpose of a dirt seal, obviating the necessity for a mud pan.

Multiple piston rings are used. There are only two grooves in the pistons, both of these being above the wristpin, but in these two grooves there are six rings, three 1-16 inch rings being used in each. The connecting-rods are longer than usual, measuring 15 inches from center to center, thus reducing angularity to a large extent. In spite of the length the assembly is of light weight as the rod with four bolts weighs



Above—Three-quarter view of Mercer 22-70 four-passenger sporting model. Right—Top view of same, showing seating arrangement





Plan view of Mercer 22-70 chassis, showing arrangement of magneto and pump drive by means of cross shaft at front of motor. The U-S-L starting and lighting system is used. Note service brake on propeller shaft behind gearbox

but 4 pounds and 1 ounce. The crankshaft is 2.125 inches in diameter and both the main and connecting-rod bearings are of bronze lined with babbitt.

The camshaft is driven by a 2-inch Coventry chain attached to the crankshaft and to a single camshaft gear. On the crankshaft sprocket is the worm gear which drives the magneto and water pump cross-shaft. Since the magneto is on one side and the water pump on the other a balanced drive is given on the cross-shaft.

As would be expected from a motor designed for high speeds the valves are exceptionally large, having a diameter of 2.25 inches. The valve stems are threaded at the end for carrying the spring retainers and the material is tungsten steel. By the use of the threaded valve stems the tension on the valve spring can be regulated by inserting a screw-driver in the slot on the head of the valve and turning to the required adjustment. If it is desired to change a valve spring or to remove a valve it is possible to remove all the tension from the spring by turning the valve until the spring retainer is lowered sufficiently to take the strain off the spring. The push-rods and push-rod adjusting screws are good examples of how care has been taken in manufacture to keep the weight as low as possible. These are hollow. The lower ends of the push-rods are fitted with rollers which ride directly on the cams.

Five-Bearing Hollow Camshaft

The camshaft is carried on five bearings. It is of hollow section and is carried in a continuous oil bath.

Lubrication is by a high pressure system. The oil is forced to all bearing surfaces under pressure varying from 10 to 20 pounds at slow speeds to 50 and 60 pounds at high speeds. The leads are all self-contained, there being no external oil pipes in any portion of the motor. The pump carries the oil directly to the camshaft and crankshaft bearings through leads drilled through the webbing in the crankcase casting.

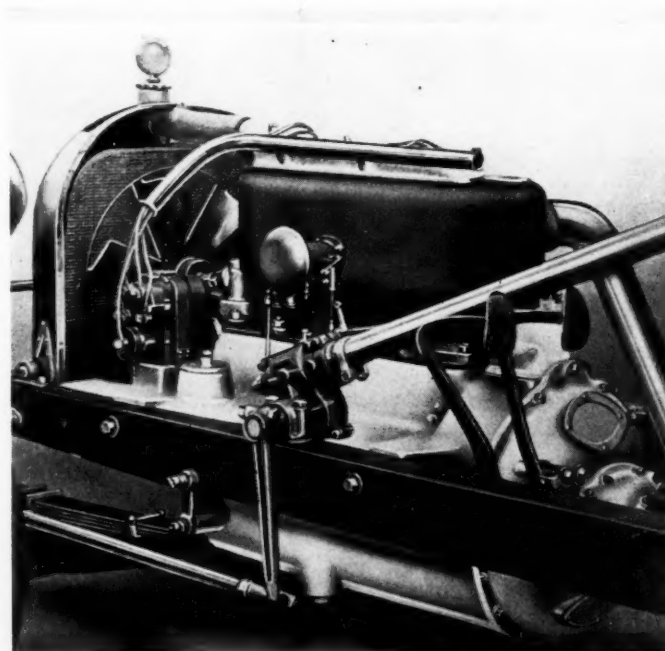
Ignition is by single Bosch high-tension system and the balance of the electrical equipment is made up by a U-S-L starting and lighting installation. This operates at 12 volts and while worked out to the special requirements of the Mercer car does not differ materially from the general U-S-L system. The apparatus consists of a motor-generator which takes the place of the flywheel. The storage battery is of 100 ampere hour capacity. The clutch is contained within the starting and generator housing on the sporting and runabout models. On the raceabout it is embodied in the flywheel as

no starting and lighting system is supplied. The clutches for all bodies, however, are the same, being a dry-plate disk type.

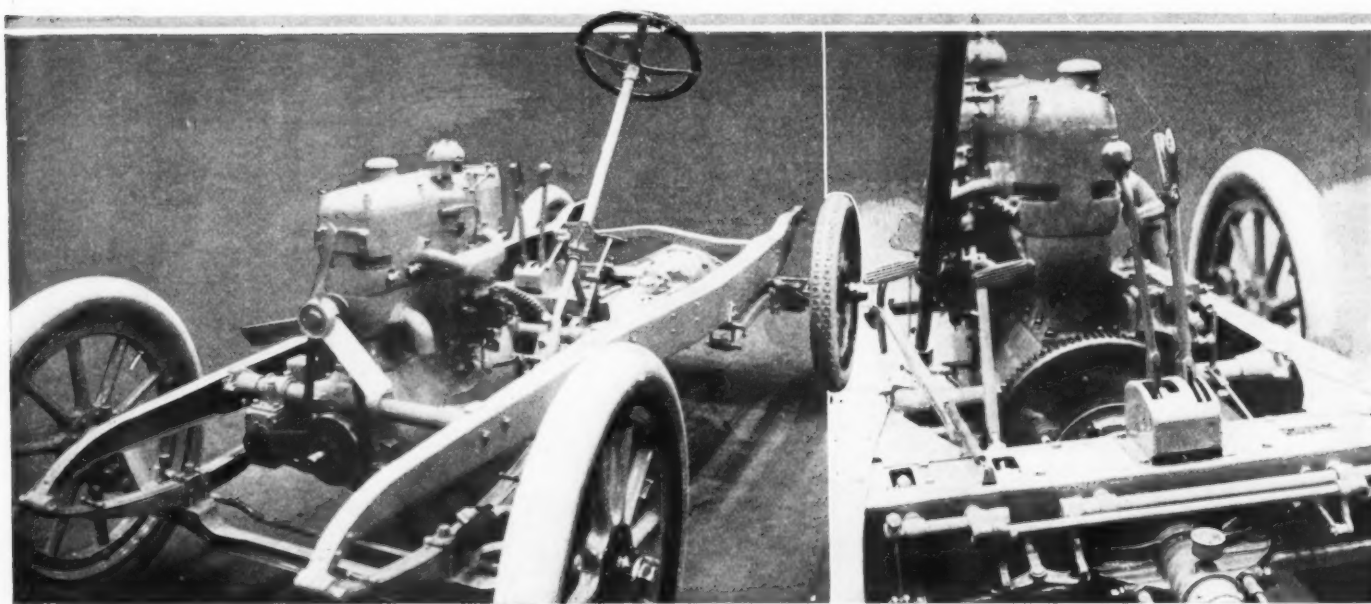
The gearset provides four speeds and has a distinctive locking device which does not permit the gears to be shifted unless the clutch is disengaged.

The rear axle is floating. The springs are semi-elliptic all around, being 2.5 by 38 in front and on the touring and sporting models 2.75 by 58 on the rear. On the runabout and the raceabout the rear springs are 2.5 by 52. The rear springs are underslung and are located directly underneath the side rail. The drive is of the Hotchkiss type, both thrust and torque being taken through the rear springs.

A channel section frame is used with an arch over the rear axle. The front axle is an inverted Elliott design. The brake for service use is on the propeller shaft while the emergency brakes are on 16-inch drums attached to the rear wheels. Both the shaft and rear wheel brake are internal



Left side of Mercer 22-70 motor. Note clean design, radiator mounting and arrangement of magneto on transverse shaft



Left—Chassis of new I-head block cast six-cylinder Chalmers model 32. Note clean design of motor. Right—View of the motor from the rear, showing cross member of frame carrying center gearshift levers

expanding. The wheels are wire on the sporting and race-about cars and on the touring they are wood with Howard demountable rims. Wire wheels are Rudge-Whitworth.

The cars are sold fully equipped, all models excepting the speedster design being fitted with a one-man top, Jiffy curtains, pump, jack, windshield, speedometer and a full set of tools. On the cars using wire wheels an extra wire wheel is supplied and on those using the wood wheels an extra demountable rim. The tire size is 34 by 4.5 on the cars using the 130-inch wheelbase and 32 by 4 on the cars using the 115-inch wheelbase.

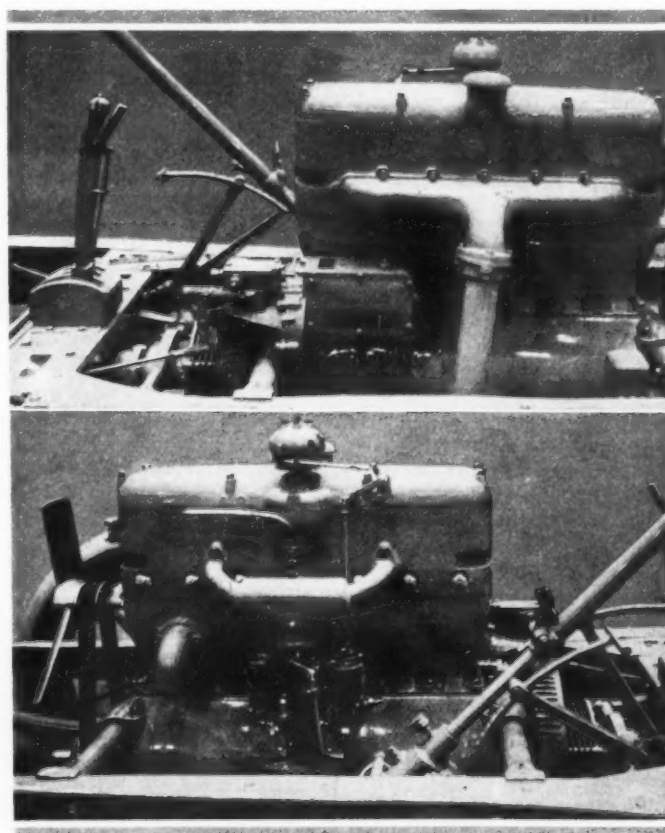
Chalmers Exhibits Overhead Valve Motor

Seen for the first time at the New York show the Chalmers new six, with its overhead camshaft motor, is attracting more than passing attention. This car, selling at \$1,400, and having throughout specifications of a sturdy design, is an event in the field of low-priced sixes.

It is in the power plant that the most important features of this new car stand out. The 3.125 by 5-inch cylinders are cast in a block with a unit removable head. While the valves are in the head of the motor the drive is a new system for use in connection with this type of motor. A shaft runs transversely from the crankshaft to the right side of the cylinder block, where it connects through spiral gears with a shaft running vertically upward to drive the camshaft. None of this shafting can be seen on the exterior of the motor, but the vertical shaft is extended above the casing and on this is mounted the distributor for the Atwater Kent ignition system. The use of the overhead camshaft is designed to give a direct action on the valves and to overcome the objection of noise which is apt to develop in long rods and linkage.

The camshaft is driven by steel and bronze gears and carries the cams integral. The inlet valves are nickel steel and the exhaust valves tungsten steel. They are all fully inclosed and are oiled from a hollow camshaft. The cams provide a 5-16-inch lift for the valves.

The carbureter is a Rayfield hot-water jacketed and with the intake air heated by contact with the exhaust manifold. There is a gasoline adjustment on the dash which controls the supply through the nozzle. A special intake manifold priming device is also on the dash, thus giving a hand control of the carbureter functions for both climatic and varying grades of gasoline conditions.



Two views of the new Chalmers six-cylinder motor. The upper shows the exhaust side, giving an idea of the compact, clean design, while the lower shows the intake side. Note the short manifold, high carbureter mounting and spark plugs set in at the side

The drive is taken by a dry-plate multiple-disk clutch which has alternate Raybestos and steel plates. The gear-set provides three speeds and the drive is through an inclosed shaft with a torsion tube bolted to the housing of the gearset. The axle is floating with a pressed steel housing. The rear wheels are carried on Hyatt high-duty roller bearings and the differential on Timken taper rollers. The brakes are on the rear wheel hubs with the service set contracting, being

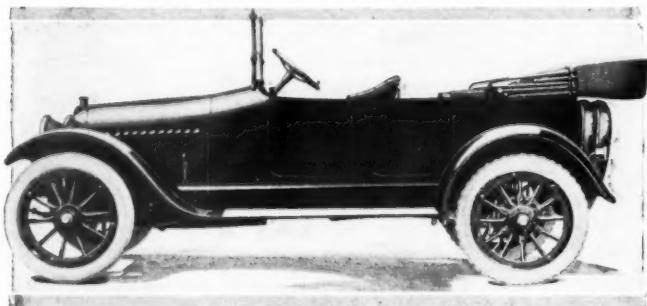
14.375 inches in diameter and 2.25 face width. The emergency brakes are expanding and have a diameter of 14 inches and a face width of 2 inches.

The bodies are sheet metal over a wood frame and are made in five-passenger touring style only. They are on a 120-inch wheelbase and have 34 by 4-inch tires. The equipment is complete with a Gray & Davis two-unit starting and lighting system, one-man Pantasote top, windshield, double bulb headlights, demountable rims with one extra rim, Stewart speedometer, tire carrier, magnetic gasoline gauge, Klaxon horn, license brackets, ignition switch lock, Collins adjustable curtains, tonneau carpet, driving compartment rubber mat, robe and foot rails, pump, jack, full set of tools and tire repair outfit.

Premier Adds T-Head Six

In addition to the Weidely model the Premier company has announced a new model, seen for the first time at the New York show. This is a six with a 4 by 5.5, T-head motor with the cylinders cast in threes. The motor is of Premier manufacture and has a water jacketed intake and multiple exhaust. Carbureter is a Rayfield fed by the Stewart-Warner vacuum system.

Lubrication is by a combined pressure and splash system with the oil carried in the customary reservoir beneath the crankcase and fed by a gear pump to the main bearings from which it flows to the splash troughs. Cooling is by water circulated by a gear-driven centrifugal pump through a V-shaped radiator. Ignition, lighting and starting is taken care of by a combination Remy outfit which operates at 6 volts. The headlights are double bulbs without side lamps. There is a combination tail and license lamp and lights for the instrument board.



New Chalmers model 32 six-cylinder touring car

The clutch is a disk with dry plates and the gearset provides three speeds. The drive is by shaft to a Timken floating rear axle with helical bevel gears. While the wheelbase is the same for both the touring and roadster models, 132.5 inches, the tires are 36 by 4.5 on the touring model and 35 by 5 on the roadster. The springs are semi-elliptic all around, those in the rear being of exceptional length, 60 inches, with shackled ends. Shock absorbers are provided as standard equipment.

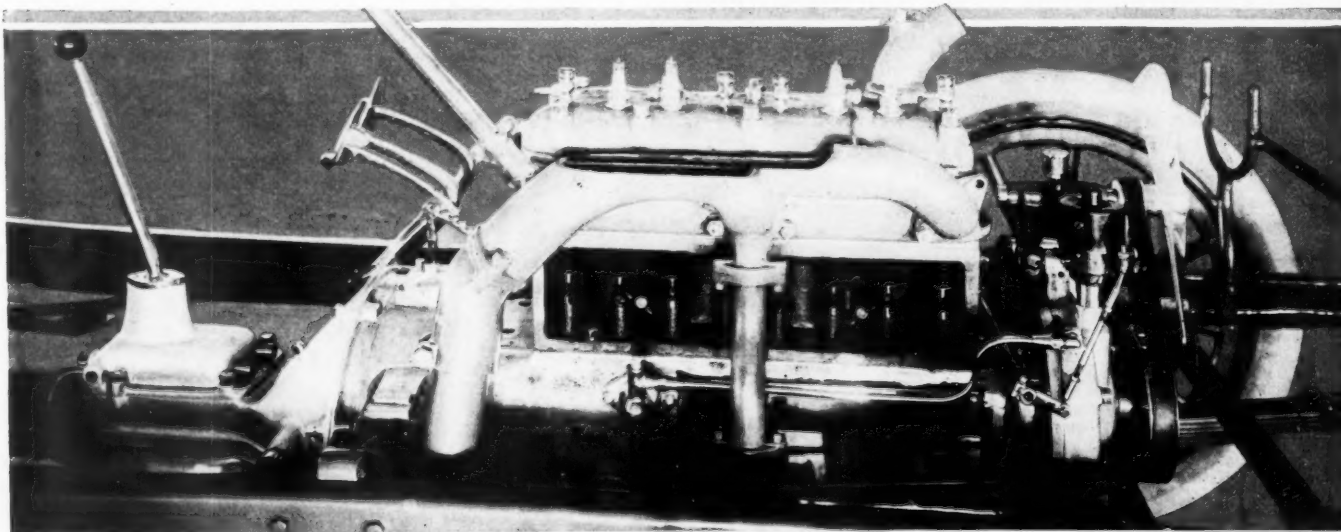
The equipment is complete at the purchase price, \$1,985 for both touring and roadster. In addition there is a coupelet for which the price has not as yet been set. The standard color is royal blue and equipment consists of a one-man top, Jiffy curtains, envelope, windshield, foot-rail, robe-rail, Warner speedometer, jack, Kellogg tire pump, trouble light, extra rim and full set of tools. There is a tire carrier on the rear for carrying one or two spare tires.

The body is a moulded six-passenger design with a long cowl constructed of sheet metal panels over steel braced oak framework. The hood is a stamping and the fenders are flanged to give additional rigidity. Upholstery is in leather, tufted and lined with curled hair. The seats are divided in front. Wire wheels are sold at \$50 extra on the touring car and on the roadster they are optional equipment.

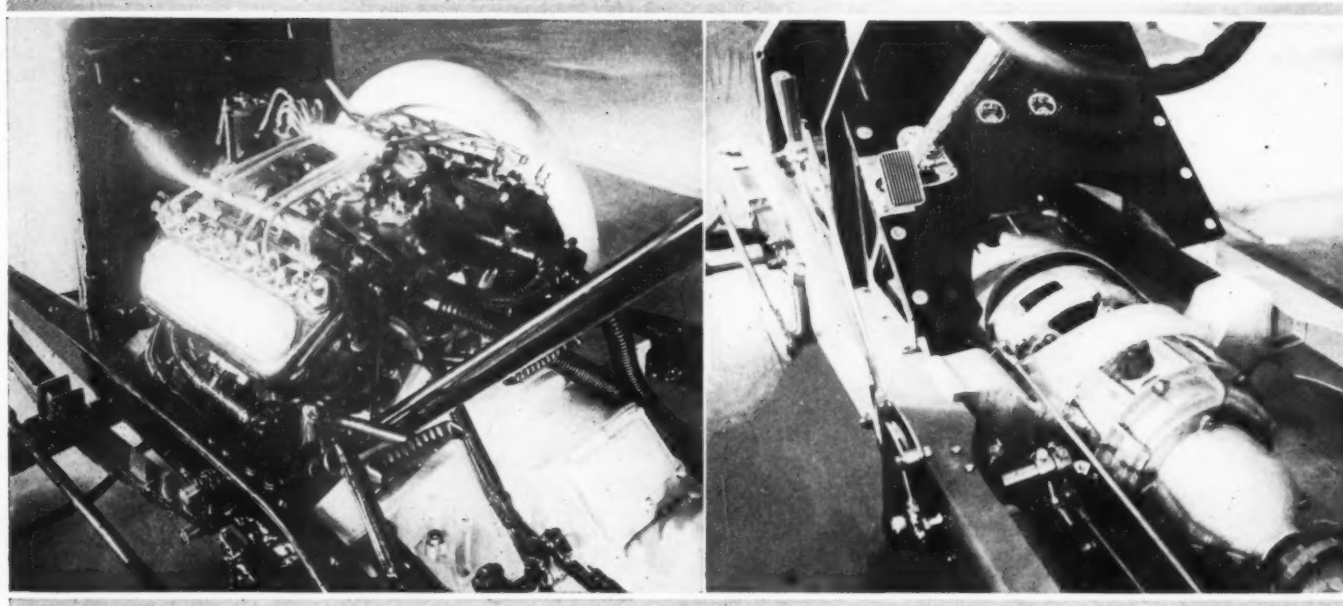
Malcolm New Small Four

The Malcolm, a product of the Malcolm Motor Co., of Detroit, Mich., and made only in roadster form, is one of the new models to be first seen at the show. This is a light car job throughout, having an L-head block cast motor of 2.875 by 4 dimensions with a two-bearing crankshaft. The crankshaft is exceptionally large, having a diameter of 2.5 inches. The motor is designed for lightness and hence shows very little in the way of exterior fittings. The clean appearance is heightened by the use of thermo-syphon cooling, which eliminates the water pump, and by inclosed valve actions with thumb screws to hold the cover plates in position.

Ignition is by the Atwater Kent battery system and the carbureter is a Zenith. The price of \$425 is exclusive of the electric lighting and starting system, but when this is fitted at \$70 additional it is an Allis-Chalmers. The clutch is a cone, and the gearbox contains a three-speed selective gearset. The wheelbase is 100 inches and the tires are 28 by 3. The wheels are wood, and left steering and center control are used. Both the front and rear axles are Walker-Weiss, the rear axle being semi-floating and a bevel-gear.



Manifold and valve side of new Dort four-cylinder power plant, showing left drive, center control and with section cut away to show twin exhaust manifold



Left—Eight-cylinder motor of the new Briggs-Detroit. Note carburetor and distributor mounted between cylinder blocks. Also note flexible exhaust manifolds. Right—Electric transmission used on the Owen, which takes the place of clutch, gearbox, etc.

The electrical equipment is the only option offered at an extra price, as all the other equipment is included with the car. A feature is the silk mohair top.

Detroit Eight Seen at Show

The Detroit eight, while announced shortly before the show, makes its first appearance at this event. It is equipped with a Perkins eight-cylinder motor with the cylinders cast in fours and arranged in a V in accordance with the scheme so far generally adopted by users of the eight motor. Other than the new motor the car does not vary to any great degree from the previous Detroit. In fitting the new motor the wheelbase did not have to be altered and the entire remaining specifications of the car remain practically the same. The tires, however, are slightly larger, being 33 by 4 instead of 32 by 3.5.

The new eight motor is a 2.75 by 4.5, with the valves on the left for the left block of four cylinders and on the right for the right cylinders. The two-cylinder blocks bolt to a common crankcase and have their center lines at an angle of 90 degrees to one another. With this arrangement a single crankshaft is used which is similar in design to that of a four-cylinder type. The connecting-rods of opposite cylinders attach to the same bearing, one having a yoke end and the other a rod going between the arms of the yoke.

Only one camshaft is required and the cams for each set of cylinders operate the valves of the opposite cylinder also.

The carburetor is a Rayfield, one instrument being sufficient for the entire eight cylinders. This is mounted between the two blocks of four cylinders and so arranged with the intake manifold that an equal distribution of gases will be fed to both sides of the V. Ignition is by the Atwater Kent system and starting and lighting by the Remy two-unit device.

In revamping the chassis light weight has been sought in the use of drop forgings in place of castings. The gasoline tank is now under the cowl, and while this was used in the four-cylinder models of this season it is still a 1915 departure for the Detroit company.

The clutch is a cone and the gearset provides three speeds. Both these units are new, as the clutch was a disk in the four-cylinder model. Both the clutch and gearbox are products of the Massnick-Phipps concern. Steering is on the left and is accomplished by a Gemmer gear. Control is in the center.

Both the front and rear axles are of Weston-Mott manufacture.

So far the only body supplied is a touring, but both that and a roadster are marketed as regular stock at \$1,295. Equipment is complete as generally offered, consisting of a one-man top, speedometer, windshield, pump, jack and a full set of tools. The tires are Goodrich and are non-skid in the rear.

Dort in Two Chassis Sizes

The Dort car manufactured by the Dort Motor Car Co., a new concern which has recently incorporated for \$500,000 under the laws of Michigan, and which consists largely of the stockholders of the Durant-Dort Carriage Co., made its first appearance at the New York show.

While practically on one chassis, as far as general design is concerned, the touring and roadster models which make up the line are carried on different wheelbases, have different size motors and different tires. The touring model, which sells for \$680 without starter, has a 105-inch wheelbase, 30 by 3.5 tires and a 3.25 by 5 powerplant. The roadster, selling for \$495 without starting equipment, has a 92-inch wheelbase, 30 by 3 inch tires and 3 by 4 motor.

Both chassis have the same characteristics in other particulars. The motors are block cast, having four L-head cylinders. The motor itself is a product of the Dort company, which is closely allied with the Chevrolet and other Flint industries. It is designed for light high-speed work, has a two-bearing crankshaft and the distinctive feature of a large diameter for this unit. The crankshaft has a diameter of 1.75 inch and is carried on exceptionally long bearings, the front measuring 3 5-16 inches and the rear 4 1-16 inches. Another distinctive feature of the motor is the twin ejector type of exhaust. With this manifold cylinders 1 and 4 exhaust in one passage and 3 and 2 in another, thus avoiding any chance of dead gases entering the wrong cylinder and at the same time helping to create a vacuum into which it is easy for the motor to exhaust at low pressure.

Ignition is by the Connecticut battery system and the carburetor is a Marvel model H. The lighting and starting system which, when electric, sells for an additional \$45, is the Apleo. When this is not supplied an acetylene generator and full set of lamps take its place.

The clutch is a leather-faced cone and the gearbox provides

three speeds with a selective arrangement. A feature of the car is that the entire drive from the clutch to the rear wheels is taken through 3.5 per cent. nickel steel as the gears in the gearbox, the 1-inch propeller shaft and the bevel-gear rear axle with its 1.25-inch shafts are all of this material. The spring suspension is a floating cantilever with the drive taken through the torque tube. The manufacture of the rear axle is Walker-Weiss.

The touring body has a five-passenger seating capacity and the standard colors are green and red with black. On the roadster which seats two passengers the colors are black and green. The equipment on the touring car consists of a one-man top, electric horn, generator, windshield, speedometer, license brackets and a full set of tools. The equipment on the roadster is the same with the exception of the windshield.

Remington Announces an Eight

One of the eight-cylinder surprises at the New York show was the Remington, fitted with a Perkins V motor in two blocks of four and selling in touring and roadster forms at \$1,495 on a 116-inch wheelbase.

As is customary in the eights, the cylinders are L-head with the valves on the right side of the right block and the left side of the left block. A single crankshaft is used and the two blocks of four cylinders bolt to the common crankcase. The cylinder dimensions of the Remington eight are 3.125 by 4.5. The connecting-rods are the fork and yoke design providing for a crankshaft which does not differ from that of a four-cylinder motor. The valves are operated off a common camshaft and a single carbureter provides for all eight cylinders through a symmetrically designed intake which is arranged to feed both sides of the V and to provide equal distribution of the gas.

Ignition is by a battery system, and lighting and starting by Gray & Davis. The clutch is a disk and the gearbox provides three speeds. The drive is taken through a shaft and bevel floating axle of Salisbury manufacture. The wheels are wire and the tires 34 by 4 inches. Control is in the center, and left or right drive is optional.

The bodies furnished with this car are not radical departures from the moulded forms that have come into fashion during the past two seasons. They are of five and two passenger capacities and their standard color is Brewster green. The equipment is inclusive at the quoted price, consisting of one-man top, windshield, speedometer, demountable rims with one extra, license brackets and a full set of tools.

Chevrolet Shows New Four

A new car at \$490 is the offering of the Chevrolet Co., exhibited for the first time at the show. This car, while smaller than any put out by the Chevrolet company in the previous

season, follows very closely along the lines of the other Chevrolet cars. It has a Mason valve-in-head motor with a detachable cover-plate concealing the overhead valve action and at the same time helping to silence the motor. The detachable head is aluminum and can be lifted off readily when it is necessary to inspect the valve mechanism.

The dimensions of the new four which is a block design are 3 5-16 by 4 3-16. The cylinder head is a one-piece casting secured to the cylinder block by bolts making a readily removable assembly. Lubrication is by circulating splash and ignition by a single Simms system with hand control. The carbureter is a Zenith and the starting and lighting system an Auto-Lite 6-volt installation.

A cone clutch delivers the power to a three-speed selective gearset located amidships. Final drive is by bevel gear to a semi-floating rear axle. The tire size is 30 by 3 inches all around and the wheelbase 102 inches. The wheels are wood and the car has left drive with center control.

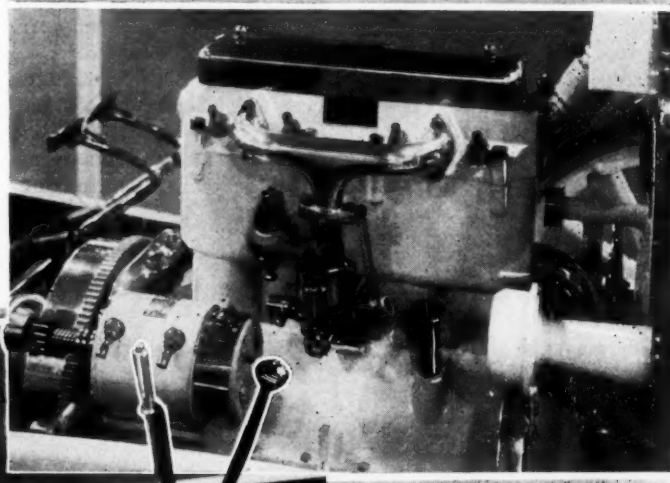
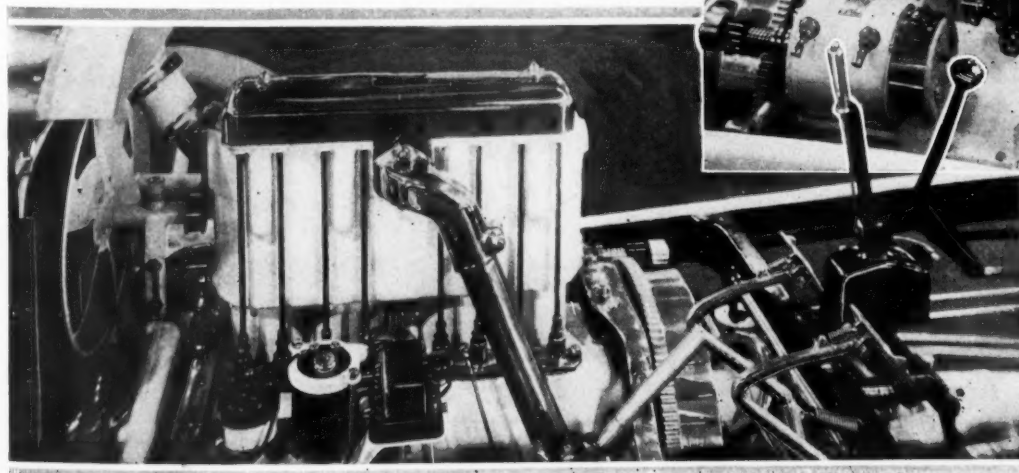
The all-steel body supplied with the new model is a five-passenger touring and it is fully equipped with top, windshield, speedometer, jack, pump and a full set of tools. The purchase price includes the lighting and starting system and a full set of electric lamps.

Lexington Adopts a T-Head

The new Lexington four was first exhibited at the New York show. It is changed in several respects from the four of last season, having gone to the longer stroke type and being one of the few examples of where a concern has shifted from the I-head type of motor to the T-head. The motor is now a Teetor 3.875 by 5.25, with its four cylinders cast in a block. Another point in which a change has been made is in the spring suspension, which is now cantilever instead of three-quarter elliptic. Starting, lighting and ignition is by the Westinghouse combination system and the wheelbase is 115 inches.

The use of vacuum feed on this model has enabled the designers to secure a more accessible arrangement of the carbureter and to shift the gasoline tank from under the

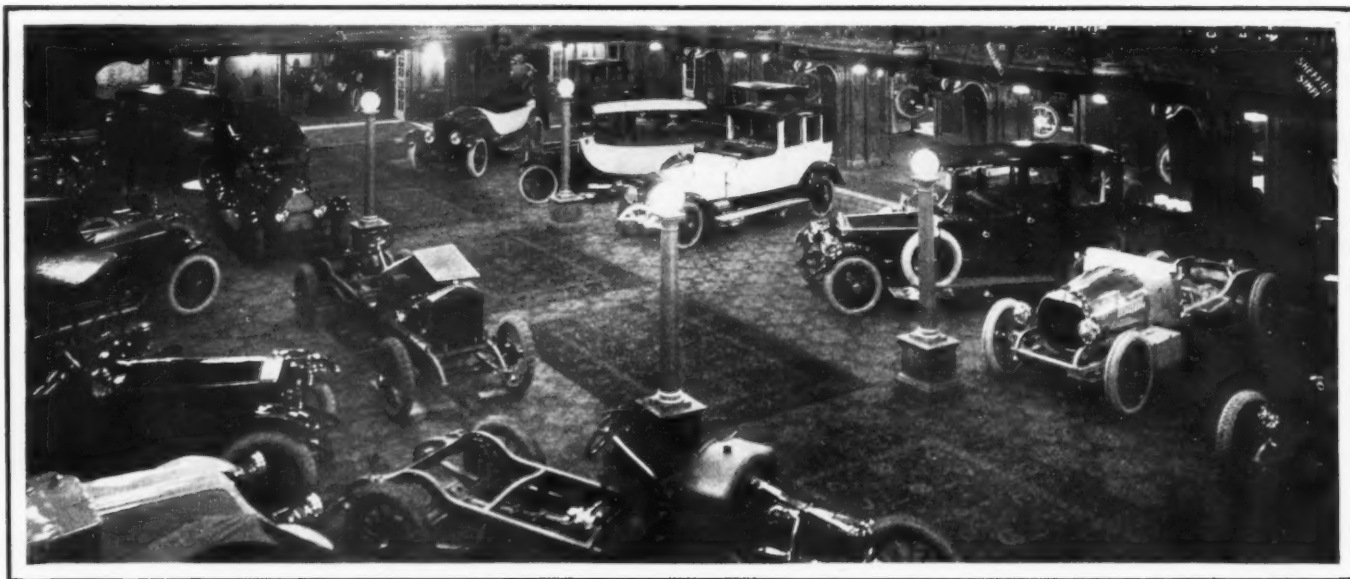
(Continued on page 39)



Above—Intake side of new four-cylinder Inter-State, showing mounting of Bendix gear on flywheel

Left—Exhaust side of same power plant, showing mounting of distributor. Also note detachable valve cover

Forty Cars at Importers' Salon



General view of the salon for imported automobiles on the floor of the grand ballroom at the Hotel Astor

Nine Manufacturers of Cars, Three Body Builders and Three Tire Makers Exhibit—Two American Car Firms

NEW YORK CITY, Jan. 2—With forty examples of foreign and domestic elegance on the spacious floors of the Astor ballroom, the Importers' Salon opened here today. The products of eight foreign manufacturers and two Americans are on exhibition, in addition to the products of several of the representative body makers of England, France, Belgium and the United States. The foreign manufacturers represented are DeDion-Bouton, Peugeot, Isotta-Fraschini, Lancia, Renault Frères, Rolls-Royce, Sheffield-Simplex and Delaunay-Belleville. The body makers represented are Holbrook, Locke and Brewster. In addition to these there are several body manufacturers who have their products incorporated with the exhibits of the manufacturers. Faure, Dunlop and Hardmann tires are also shown.

In spite of disturbed conditions abroad several new models are to be seen in the exhibits at the Salon. DeDion shows six cars, two mounted on 50-horsepower, eight-cylinder chassis, one on a 20-horsepower eight-cylinder, and two with different bodies on a 16-horsepower four-cylinder chassis.

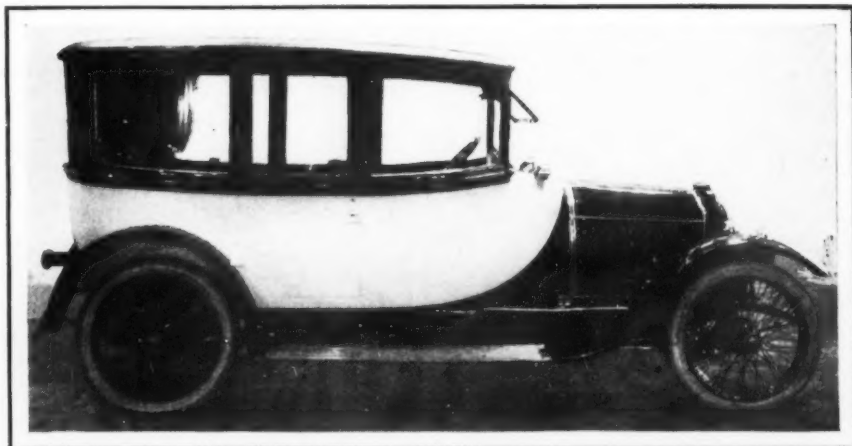
The two touring car bodies are built by Holbrook and are streamline touring models with the double cowl which has been the feature of foreign bodies of elegance during the past year. On the 20-horsepower eight there is a limousine by Healey & Co. On one of the 16-horsepower fours there is a landaulet by Healey and on the other an inside drive body by Holbrook.

DeDion Bodies New

With the exception of the body work the DeDion chassis has had no alteration during the past year. The bodies, how-

ever, show the effect of a year's development in moulded design. The touring bodies, following the practice now used by the leading body makers, are in dull oil finish. Town car bodies, such as limousines, landaulets and inside drive cars are keeping the polished surface.

Fiat has made no important changes in mechanical design but some of the motor and chassis dimensions are slightly larger to accommodate the longer bodies. The wheelbase has been increased 2 inches on both the 20-30 and the light 30 which are on display. Altogether Fiat is showing six cars. On the 20-30 there is a limousine and a coupé by Fleetwood and on the light 30 a touring, limousine, sedan and a runabout by Brewster. The feature of Fiat exterior is in the use of the moulded radiator which gives an elliptical appearance to the front of the car. The body work on these cars also



Glass-cabin launch body on the DeDion exhibit, which was one of the body features of the show

exhibits a tendency toward the oil finish for all around work and the polished finish for town use. The fitting of the one-man top on cars of higher price is brought out strongly by its use on the bodies exhibited at the Salon.

Peugeot is showing four cars. These are a stripped chassis, a Baby Peugeot, a racing car and a five-passenger touring body. The latter is an example of quiet luxury in this standard type of body. It is from the plant of G. Mossier, Neuilly on Seine, and is one of the striking bodies at the show.

The Isotta exhibit includes two touring cars, both of seven-passenger capacity, a seven-passenger collapsible landaulet, a special high-speed roadster and a stripped chassis. One of the touring cars, which is mounted on a 45-55 chassis, is a striking adaptation of the streamline design. It is black with satin finish. The seven-passenger body on the 12-horse-power chassis has an aisle between the front seats. A special feature on both these cars is the inclosing of every moving part.

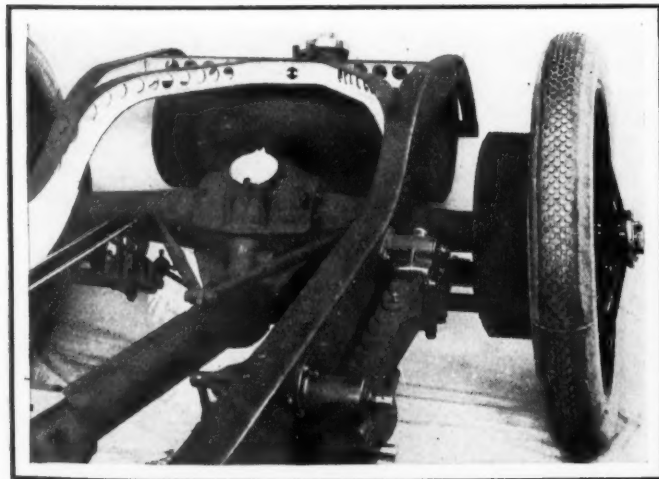
Isotta Has Front Wheel Brakes

The Isotta exhibit is of interest in that it is an example of the use of front wheel brakes. On one of the models there is also a brake fitted on the transmission shaft, giving three sets. The special 55 roadster shows a departure from the regular 55 car which is furnished with a touring body in that it is an example of light weight construction throughout. It has the same dimensions as far as the power plant is concerned as the regular 55 but in addition it is fitted with hollow connecting-rods, a hollow driveshaft and lighter frame, giving a greatly reduced weight and rendering possible high speeds. It is classified as a gentlemen's roadster and is a good example of a luxurious speed type. It has a seating capacity of three passengers. The wheelbase is much shorter than that of the regular 55 being 129 inches as compared to 135 on the touring cars mounted on this chassis. The motor is 120 by 160 millimeters or, in inches, 4.2 by 4.6.

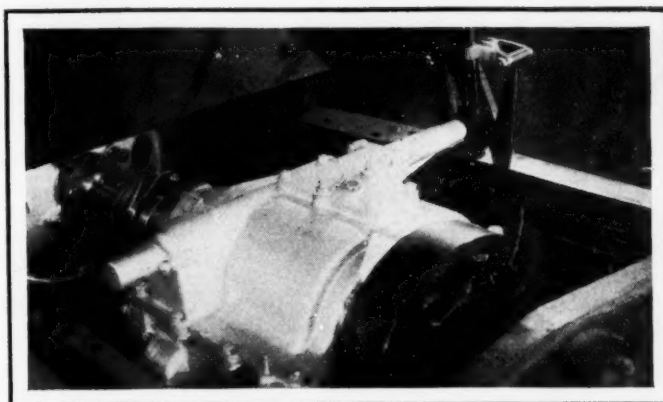
On the 25-35 there is a Vanden Plas collapsible body that is of the design which bears its name but which has been made in this country.

A striking feature of the DeDion exhibit is a boat-line touring car with white body and having black hood and black running gear. No top or windshield is shown on this body and in place of the side lamps there are ventilating cowls which give the appearance of a marine body.

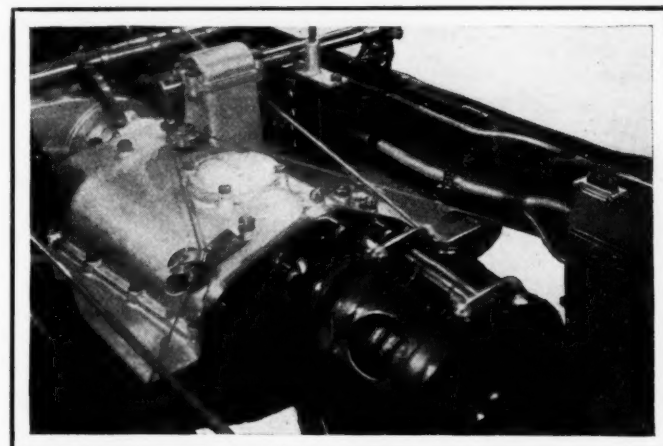
There are nine Lancia cars exhibited. Four of these have Holbrook bodies showing original developments of the limousine, landaulet, coupé and inside drive type. Two are by Hayes and Miller showing a special design of four-passenger car and a runabout and three are by Fleetwood. These are an inside drive sporting type, a limousine and a coupélet. In



Rear construction of the Sheffield-Simplex, a newcomer to the salon



Peugeot gearset housing of cast aluminum, showing a neat support of the control linkage



Simplex gearset and transmission brake which has been adopted for this season

addition there is a stripped chassis. No mechanical changes are to be noted, the luxurious bodies being the feature. The high spots in Lancia design are the compact block-cast motor and the chain-tightened brake on the propeller shaft.

Sheffield-Simplex a Newcomer

Sheffield-Simplex is a new arrival to the ranks of Salon exhibitors this season. The 30-5 chassis which is in company with another having a genuine Brussels Vanden Plas body. The Sheffield-Simplex is fitted with the U. S. L. starting and lighting system and has a Lanchester worm drive. The frame is of pressed nickel steel and throughout Sheffield steel is used in the construction work. All the fittings are nickel-plated and the springs are floating cantilevers.

Renault has eight cars at the exhibit. They are on five chassis. Four of these are fours and the other a six. All the bodies on the Renault cars are imported. They represent the works of Kellner and Rothschild of Paris and Vanden Plas of Brussels. The Renault concern is another example where a concern has taken a standard model and cut it down to light weight for use as a special high speed sporting model. The special car is a three-passenger runabout on an 18-30 chassis. It has been lightened by the use of hollow parts, lighter frame sections, etc. The power plant dimensions and the drive units remain the same as on the heavier car.

Mechanically the Rolls-Royce cars remain the same as they have for the past five seasons. There is one chassis, a six, and at the exhibit this is shown dressed in four different body styles. In addition to this there is a stripped chassis which has just arrived from the works of the British manufacturer. The bodies shown are both imported and domestic. Two are the works of Barker & Co., London. These are a

(Continued on page 25)

Magneto vs. Battery Coil—From Automobile Drivers' Viewpoint

The Automobile Engineer's Forum

Two Complete Sets of Spark Plugs with Corresponding High-Tension Cables Give Security from Troubles on the Road—
Likes Low-Tension Magneto with Separate High-Tension Coil

By Charles S. Manierre

NEW YORK CITY—Editor THE AUTOMOBILE:—You have recently published two very interesting articles on the subject of ignition, one written from the standpoint of the magneto maker and the other from that of those interested in the storage battery. There seems to be room for a third communication, from the standpoint of the man who drives.

Hidden away from observation and needing no attention, having no moving parts, and referred to only casually in instructions sent with cars, probably unknown to many otherwise expert drivers, is the condenser. I take it that no one can read the articles published by you on ignition intelligently who has not some idea of the operation of this adjunct to the ignition system.

The condenser may be briefly described as a series of leaves of tin foil, each separated from the other by paraffine paper, and each alternate leaf connected so that by a single wire it is joined to the low-tension current wire on either side of the point where the platinum contacts make and break the circuit.

The object of the device is to receive the rush of current as contact is broken and to hold it in storage, as it were, until contact closes. There is never at any time a highway for the current through the platinum leaves. It takes a brief but definite time for the current, when contact is made, to build up, as the saying is, to a point where a fat spark is obtained.

Dry Cell Type Simplest

Of course the simplest type of ignition system is that with dry cells and a timer and vibrator. The demerit of this system is, I believe, that the contact is broken by the vibrator before the spark has time to build up as it should and that a shower of sparks, all worthless but the first, results from the usual vibrator.

A refinement of the vibrator by means of a fine supplemental wire, using practically no current, gives but a single spark, but the opportunity for building up is still lacking.

The low-tension magneto has the advantage over this system in that, provided the motor is running fast enough to generate a sufficient intensity of current, the contacts yet remain together and are only opened momentarily for the production of a spark. This opening, being mechanical, occurs with great accuracy, and the building up of the spark even at the highest speeds is thoroughly satisfactory. In fact, the faster the motor runs the more generous is the spark.

The difficulty with the system is that it requires a set of dry cells on which the motor is to be run when turning at very low speed, and for starting.

When the electric cranking and lighting systems became general, many of the cars discarded the magneto and advertised that they had the magneto type of ignition, although the current was furnished from the storage battery. This was a fair enough description, for the reason that instead of using a vibrator with the comparatively large supply of current available, they allowed it to run past the contact points in the contact breaker and the building up for spark purposes was similar to that of the magneto, except that the spark is as well built up or better at the low speed of starting and the lowest speed of running as it would be in the best of magnetos.

I think I am correct in saying that it is not uncommon for makers who use the storage battery to supply for emergency purposes a set of dry cells. It would seem probable that these would be repeatedly run out by any very continuous use of them on a circuit which demanded such a semi-continuous current.

For the average man probably any of the systems in use is sufficiently good, particularly if one is within convenient

reach of supply and repair shops. With my limited experience, however, if I were expecting to get some distance from expert assistance, I would pin my faith upon a reliable low-tension magneto with its own high-tension coil separate, or possibly one of the newer high-tension magnetos capable of generating a spark to start the car, and with that outfit, a separate set of spark plugs, a dry cell battery and a one spark producing vibrator.

Two complete sets of spark plugs, with corresponding high-tension cables may give a somewhat crowded appearance under the engine head, but on the other hand probably two-thirds or more of the minor breakdowns are due to ignition, and it is frequently as important to be able to switch in an entirely new system of ignition as it is to jack up a wheel and replace a blown out casing with the spare rim and tire ready to run.

My own car is fitted in the above way and there have been instances where I would have been very much inconvenienced if I had not been so provided. Even when time is not valuable, it is much pleasanter to attend to some minor breakdown at home than to hold up a party on the road while the difficulty is taken care of, and not infrequently the mere switching in for a few moments of the other set will take care of the oil or carbon which is causing one of the spark plugs to miss.

Also, in searching for engine troubles, the mere fact that the trouble persists after switching in the other set of plugs gives one the information that the difficulty is in no wise connected with the sparking system.

Two Separate Systems

It has always seemed to me a pity that the motors built today are not provided with means for two entirely separate systems of ignition, one of which should be the dry-cell system, including timer, distributor, spark plugs, etc.

It would be comparatively easy for the private owner to install all of these items on most engines with the single exception of the extra timer, and the aggregate weight of all of the items is not great.

It would seem to be a matter of no great expense to build engines so that such an attachment could be made if desired, and it ought not to be on the same shaft with the regular timer, for the reason that through the loss of the shaft key there might be a shifting of one or the other timer which would not otherwise affect the engine. For example, if the shaft still continued to operate in connection with the oil reservoir and

water system, this could be done.

If I were in the market for a new car, the fact that a car provided for two complete ignition systems would have considerable weight with me in making a choice.

Evils of Complication

Admitting fully the inferior performance of the dry cell batteries and vibrator, nevertheless, the extreme simplicity of the system and the ability which it gives the driver to follow out, from one end to the other, the whole ignition circuit to learn what is wrong and probably to be able to remedy it, is a great promoter of

confidence and of a feeling that whatever else may happen, the spark will not fail him until he reaches his destination. For effective running and an economical use of gasoline and for many other virtues we may laud the other systems and use them as a regular sparking outfit, but when they get out of order, they are, in some of their parts at least, quite beyond the skill of nearly all drivers, and the mere addition to the system of dry cells only partially remedies the defect. The puzzle presented is complicated by the more refined system being mixed up with the one which is more simple.—CHARLES E. MANIERRE.

Likes High-Tension Magneto With Automatic Control

By C. J. Morrison

Chief Engineer Meyer, Morrison & Co., Inc.

NEW YORK CITY—Editor THE AUTOMOBILE:—The discussion of various questions pertaining to the automobile are very interesting and many are educational. Such discussions cite experiences, tests, chemical formulas, mathematical calculations, etc., and draw conclusions which must be either accepted as true or disproved by some acceptable method. However, there is another class of discussion which simply makes statements or contradicts other statements and offers no proof. Such contributions are of little value and may even be misleading.

Proofs Wanted

The discussion of battery-coil versus high-tension magneto ignition has consisted chiefly of statements unsupported by proofs. If either method has points of superiority, the facts should be known and the only way to make them known is to conduct tests under the supervision of impartial observers. Such a series of tests could be easily made and would be well worth the cost.

In THE AUTOMOBILE for December 17 H. E. Rice makes a number of statements which are contradicted by everyday experience. This fact causes his whole discussion to be doubted. His key statement: "In a well-designed ignition

equipment the spark should be uniform throughout the entire speed range of the motor," has never been proved by tests and is not even believed by many engineers. All recent, high-speed runs have been made with magneto ignition which gives the hottest spark at the highest speeds. If this is undesirable, why do not the racing drivers use battery ignition?

Every time my car is cranked, which is always by hand, it disproves the statement that a high-tension magneto will not furnish a sufficiently hot spark for starting at ordinary cranking speeds. As the cylinders are 4 1-4 inches with no provision for compression relief there is little probability that the cranking is faster than ordinary. In fact when the mixture is right it will start on the magneto with a quarter turn, although the car has made 30,000 miles and the only attention to the magneto has been a few drops of oil and an occasional cleaning. My car, in common with all others of the same make, has no provision for furnishing a spark other than a high-tension magneto. Investigations of many cars equipped with self-starters and dual ignition revealed the fact that starting was almost invariably on the magneto and that in many cases the battery connections had been taken off. Why then

should battery ignition be compared only with the dual system?

The trouble in starting in cold weather is not with the spark, but in persuading present day gasoline to vaporize. This statement is generally accepted as a fact but the doubtful can easily demonstrate to their own satisfaction. Let one who wishes to demonstrate, determine first in the usual way that the spark is present, throw off the switch and crank a few turns with the throttle in the starting position, then throw on the switch and give a half turn. If the mixture is right, the motor will start, while if it is not right neither magneto nor battery will avail.

Automatic Spark Control

The conclusion that a magneto-equipped car requires a spark control lever and its intelligent handling shows ignorance of common practice. As long ago as 1909 the Franklin discarded the spark control lever and substituted automatic control. Surely, in the face of recent tests, no one will accuse the Franklin of being inefficient.

Let us have some conclusive tests and a solution of the ignition problem. All motorists are interested.—C. J. MORRISON, chief engineer, Meyer, Morrison & Co., Inc.

U. S. Leads In Car Exports to South Africa

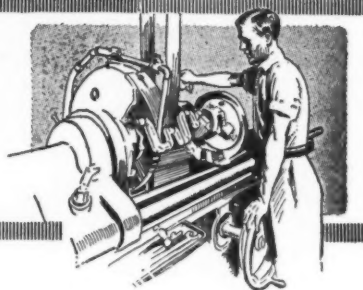
TOLEDO, O., Jan. 2—Figures furnished by one of the South African distributors of the Willys-Overland Co., showing the growth of imports of American-built cars in that territory, prove interesting. Car imports from England were falling off rapidly in proportion to the development of the automobile movement in English territory long before the declaration of war.

In the race for supremacy, which may be said to have started in 1909, England has fallen far behind the position

which she had hitherto occupied. In 1908 the total car imports from the United States were valued at a little more than \$5,000. The following year they sprang to \$90,073, and for the 4 years 1909-1912 their total value was \$1,043,515, or 29 per cent. of the value of cars imported from England for the quadrennial period.

Imports for 1913 from America were \$2,623,648 as against \$2,119,029 for England, or more than 23 per cent. in excess of England's total.

The Rostrum



This department is for the instruction of the readers and all are at liberty to ask questions. Give full name and address so that we may send you a reply by letter if there is no space in the Rostrum. If you wish to sign a fictitious name, also sign your own.

General Directions for Painting

EDITOR THE AUTOMOBILE:—Although you have probably published several times suggestions for repainting an automobile in an amateur way and still so as to get a good-looking job, I cannot find anything in the books I have, and wish to ask for this information.

I have a small touring car which is now painted dark on the body and cream on the running gear, and I wish to paint it all dark blue or black. The paint on the body is chipped and cracked very badly and will probably all have to come off. Kindly advise how many coats of paint from the metal filler up it will require and what they should be. Also advise what the paint used for striping or blocking off is composed of, and what kind of varnish is used.

Watertown, N. Y.

SUBSCRIBER.

—By careful effort you can do a fairly satisfactory job of painting, but you cannot expect to equal the work done by an expert. The materials may be obtained from any paint manufacturer.

First of all, the old paint must be removed, and this is done by applying a paint remover and scraping the old paint off with a putty knife. One gallon will be required.

If it is a wood body, a lead coat or a wood filler must now be applied to fill the small roughnesses in the surface, and if the body is metal a metal primer should be put on. The wood filler and the metal primer may be bought ready mixed, and one quart will be required. The lead coat may be made by adding a small amount of turpentine and boiled oil in equal parts to 1 pound of white lead. The mixture should be of a consistency to flow freely but not too freely.

A lead coat is then applied whether the body be metal or wood, the lead being merely a mixture of white lead, and turpentine and boiled oil in equal parts.

Three coats of color are then applied. The color comes in the form of a paste and is mixed with turpentine to make it flow. Somewhat over a pound will be required.

Next, a little over a pound of color is mixed with an equal amount of clear rubbing varnish, and three coats of this mixture are applied. After each coat dries the color-varnish is rubbed with powdered pumice stone and water.

Then the striping is put on, the job is finished by applying one coat of finishing varnish. About two quarts will be required.

Lack of Power—Poor Adjustment

Editor THE AUTOMOBILE:—1—What suggestion can you offer which will enable me to get more power from my Hupmobile model 20 car?

2—Would it be possible to install a larger motor and use the same transmission, or would it be better to get a new motor and transmission combined?

3—Would reboring the engine give me very much more horsepower?

This car is geared 4.2 to 1, but does not seem to have quite enough power on high.

Washington, Pa.

J. M. PRIGG.

—1—It is inadvisable to make any changes in this car. If it is in proper condition it should be powerful enough for you. See that the valves are ground and the push rods properly adjusted, that the pistons, rings and cylinders are not badly worn, that the carbureter and magneto are functioning correctly, and that there are no places where an excess power is consumed in friction.

If the compression is good, then the valves and pistons are tight but if the compression is poor the exhaust valves should first be examined, and any that are pitted or carbonized should be ground. Then with the motor warm, adjust the push rods so that the clearance between valve stem and push rod is .01 inch. Should this not improve the compression, new rings or possibly rebored cylinders and slightly larger pistons will be required.

If the car is slow to pick up when the throttle is opened, it is likely that the trouble is poor carbureter adjustment. Not knowing what make of carbureter you are using, we would advise changing each adjustment a small amount at a time until the best setting is found.

Clean the spark plugs and adjust the gaps to between 1-64 and 1-32 inch. Tighten all electrical connections and then examine the breaker mechanism. The distance between the points when the circuit is broken should be 1-64 inch and the contacting surfaces should be flat so that when they touch they will meet squarely. If these surfaces are not in proper condition they should be smoothed with a fine file such as a nail file, and then adjusted.

If the car still lacks power jack up the wheels one by one and rotate them by hand, noting whether it takes very much effort. Likewise rotate the gearset shafts. This will locate binding brakes, bearings, etc.

2—You might install a larger motor, but it would put a heavy strain on the whole car. The driving strain on the clutch gearset, drive shaft and rear axle would be increased, and the larger weight of the bigger motor would throw more work on the springs and the tires in front. But aside from this it would not be wise to put in a new motor because it would cost more than the car is worth now, and probably more than you could sell the car for even with the new motor in it.

Similar objections apply to the motor and gearset. Of course the new clutch and gearset would be better able to carry the load of the larger motor, but the extra weight of the complete new power plant would be very hard on frame, springs and tires, and the strain on the drive shaft and rear axle would also be great.

3—Reboring the cylinders would give slightly increased power but not enough to make it worth while to go to this expense unless the engine is in exceptionally poor condition.

To Wire for Speedometer Light

Editor THE AUTOMOBILE:—I have a Maxwell model 25, equipped with the Gray & Davis dynamo and motor. I wish to attach two more lamps, a speedometer and trouble lamp,

and use a separate switch. Shall I attach to the generator where the lamp wire is attached?

2—What size of bulbs should be used?

3—Will this decrease the efficiency of the present system and over-tax the dynamo and storage battery?

Elyria, O.

C. S. B.

—1—These lamps should be wired the same as the horn, that is, tap the wire running from the ammeter to the terminal on the starting motor, and insert two wires running to the frame, one of the lamps and a switch being connected in each of these circuits.

2—A 1.5-candlepower lamp should be used for the speedometer and a 2-candlepower bulb for the trouble lamp.

3—Lamps of this size will not overtax the system or appreciably decrease the efficiency.

To Tell Weak Magnets

Editor, THE AUTOMOBILE:—1—Is there any simple method to determine if the magnets of the Splittorf model O magneto have become weakened?

2—Can the pistons of an Overland car be grooved and drilled to return excess oil to the crankcase? If so, kindly furnish sketch of same.

Hoping for an early answer, I remain

Leetonia, Ohio.

S. J. PRIOR.

—1—A simple method which gives a rough idea is to take the two pairs of magnets and place them together end to end so that the opposite poles are in contact. The attraction should be sufficient to hold one pair against the other when held in a horizontal position and while the magnets are gently shaken. Weak magnets will be indicated by misfiring at low speed.

2—It is not advisable to drill the pistons but the best remedy is to reduce the oil level in the crankcase. If the car is a model 79, fit small stand pipes under each connecting-rod. These pipes should be about 7-8 inches high so that excess oil will drain back to the reservoir in the bottom of the crankcase.

On the model 69, there are two stand pipes, one for each compartment of the motor. By cutting off about 1-4 inch, the oil level should be reduced enough to prevent over lubrication.

Why Ford Uses Vibrators

Editor THE AUTOMOBILE:—1—Why does a Ford car require vibrators on the coils? As I understand it, alternating current does not require a vibrator and the Ford magneto generates an alternating current.

2—What is the object of the breaker box found on most cars outside of the Ford?

Rixford, Pa.

CHAS. EVERS.

—1—You are right, an alternating current does not require a vibrator but the reason vibrators are used on the Ford coils is so that more than one spark may be produced each time the circuit is closed, the idea being that several sparks in quick succession are better than a single spark, especially when the mixture is poor.

2—The breaker mechanism takes the place of the vibrator. The basic difference between the breaker and the vibrator is that the former breaks the circuit mechanically, some form of a cam separating the breaker points, while in the vibrator the points are separated magnetically, the operation being similar to that used in the electric bell.

Now, the object in breaking the primary circuit suddenly either by using a vibrator or a breaker is to cause a quick stoppage of the current flowing in the primary circuit. Around the primary of the induction coil there is a strong magnetic field proportional in its strength to the amount of current flowing in the primary. This field extends through the windings of the secondary coil, which are directly outside

of the primary windings. The voltage generated in the secondary depends on how quickly this primary field rises or falls in strength. Therefore, if the primary circuit is suddenly broken, the field will quickly die down to nothing and the result will be a high-voltage generation in the secondary or high-tension coil, this voltage being high enough to jump the spark gap at the plug. The action, in principle, is the same whether the circuit is broken by means of breaker or a vibrator.

Not Advisable to Reduce Tires

Editor THE AUTOMOBILE:—I want to reduce the size of my tires on a car using 34 by 4.5-inch tires. Is there a smaller size that will fit these rims without alteration?

For instance, how would the 33 by 4-inch tires go on these rims? Also what effect would this reduction of wheelsize have on the speed of the car?

Ft. Fairfield, Me.

A. P. G.

—Yes, 33 by 4 tires may be used. It is not advisable to reduce the size of the tires because it will undoubtedly increase the tire cost per mile. Since your present tires are 34 by 4.5 inches, the diameter of the rim is 25 inches ($25 + 4.5 + 4.5$), and any tire with an inside diameter of this amount will fit your rims. Therefore if you select a tire of 32 inches, it must have a section of 3.5 inches; a tire 33 inches in diameter must have a section 4 inches in diameter in order to have the requisite inside diameter. The reduction in speed is not worth considering, as it would only be the ratio of the two tire diameters, or a mile or two an hour.

High and Low Speed Motors Compared

Editor THE AUTOMOBILE:—Please explain by sketch and description the difference between a high and a low-speed motor? 2—Explain the difference between a T- and an L-head motor?

Yonkers, N. Y.

JOHN KELLY.

—1—The difference between the low and high-speed motor can hardly be shown by sketches. The former has a speed of about 1,500 revolutions per minute and the latter a speed well towards 3,000. The high-speed motor has a smaller bore, the reciprocating parts are lighter, the timing is changed to suit the high speed, and the parts are generally in better balance in order to reduce the vibration due to the excessive speed.

2—These motors take their names from the shapes of the respective combustion chambers, the combustion chamber consisting of valve pockets and piston space. In the T-head motor the intake and exhaust valves and valve pockets are on opposite sides and two camshafts are used. In the L-head all the valves are arranged on one side.

Weak Magnets Cause Miss

Editor THE AUTOMOBILE:—Have been having some trouble lately with car. The motor skips when running slowly or pulling hard on high gear if the spark lever is advanced more than half way on the quadrant. As soon as I retard the spark below this point the engine picks up and will pull as well as it ever did. Why is this? It is not the fault of the carbureter, as I have tried all kinds of adjustments and have operated it under every conceivable condition.

Vineland, N. J.

R. W. CALL.

—If the magneto is correctly timed it is probable that the trouble is due to weak magnets. When the spark lever is advanced all the way the spark actually occurs when the armature is at the edge of the magnetic field instead of being in the position where the strength of the field is greatest. Therefore if the magnets are weak the effect must first be felt at the weakest point in the field, and that may be either

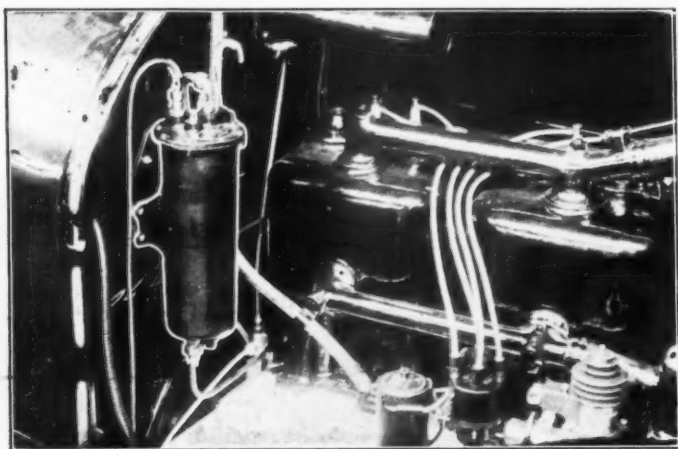


Fig. 1—Mounting of Stewart-Warner vacuum feed tank on dash

a position of great advance or retard, depending on how the magneto is linked up. Recharging the magnets should remove the trouble.

Stewart-Warner Vacuum Tank Mounting

Editor THE AUTOMOBILE:—Will you please illustrate the mounting of the Stewart-Warner vacuum feed system?

Hicksville, N. Y.

E. W. W.

—The most usual position of the Stewart-Warner vacuum feed tank is on the front of the dash, although it may be attached at any other convenient place above the carbureter and near the motor.

It will be noted that it is placed high with reference to the carbureter and it is so near it that there is no lack of flow when climbing steep hills.

Timing of Fours and Sixes

Editor THE AUTOMOBILE:—Is there any difference in the timing of four- and six-cylinder motors, and do you believe that the shape of the cylinder head and the position of the valves make any difference?

Atlanta, Ga.

JOHN E. WARD.

—The timing for fours and sixes does not vary as it is self-evident that the number of cylinders is an immaterial factor in the valve timing where the volumetric efficiency of each cylinder and the thermal cycle of each is an entirely independent question. Manifold design is, however effected by the number of cylinders and that may have a bearing on the timing. Thus wherever difference in timing for fours and sixes would occur, it would not be because of any theoretical reason but of practical developments.

On the other hand the question of I-head, T-head or L-head shapes may affect the timing because the volumetric efficiencies of these motors would doubtless vary. Nevertheless, the I-heads do not develop any peculiarities in the timing table which would distinguish them from motors of any other shape. But, to cite examples:

Chadwick has the greatest length of inlet opening, 247 degrees, this is from 18 degrees after top center to 85 degrees past lower center. The greatest exhaust opening is on the Auburn, from 71 degrees before bottom center to 15 degrees past top center. These long openings are not usual however, the average as noted being considerably below this.

While the characteristics of the motor affect valve timing to some extent, the personal element of the opinion of the chief engineer is still the deciding factor. It is doubtless true that on the higher speed motor it is necessary to open the exhaust valve sooner in order to permit the gases to drop to atmospheric pressure at the desired time. At the same time, however, motors that are of the typical small-bore, long-

stroke high-speed type, running in cars with reductions of 4 to 1 in the rear axle, do not exhibit any marked differences on the whole, from the heavy duty motors running at much lower crankshaft speeds and with final reductions of 3 to 1 or less on direct drive.

Take Buick for an example. This concern is now the only one making the square type of motor with the bore the same as the stroke. The exhaust valve on this model with its 3.75 by 3.75 cylinder and 1 stroke bore ratio, opens at 56 degrees and 19 minutes before lower dead center. The Buda motor with 3.5 by 5.125 cylinders and a 1.45 ratio opens the exhaust valve at 55 degrees before lower center. This motor is used in many cars geared 3 to 1, and the Buick is geared 4 to 1. This does not show any material difference in exhaust practice.

A search of car specifications for a trend for any type of motor is in vain. It is not the motor type, but the motor speed and the best results that have been obtained by trial at different speeds, with different carbureters and ignition systems, that determine the results. Were it not for the inertia of the gases the logical point to open the intake and to close the exhaust would be at upper dead center at the practical beginning of the intake and the ending of the scavenging strokes; yet, there are only two who do this.

There is only one other make that utilizes the upper dead center for the opening of the intake or the closing of the exhaust alone. This is the Briscoe which opens the intake valve on the dead point and closes it at 45 degrees past lower center.

Makes Wind Wagon from Cyclecar

Editor THE AUTOMOBILE:—Fig. 2 shows a wind wagon which I built.

It has an 80-inch wheelbase, 36-inch tread. The frame is made of ash. The wheels are regular cyclecar type, no axles, the springs serving for the same. The engine is a four-horsepower motorcycle type and drives a 40-inch propellor by a 1-inch V-belt. The brakes act in the belt rims on the rear wheels and are of hard wood. About 25 miles per hour can be made, and it has a very quick get-away.

Logansport, Ind.

CLAIRE VANCE.

The Ideal Touring Car Body

Editor THE AUTOMOBILE:—Slightly over a year ago—on November 13, 1913, THE AUTOMOBILE published a drawing illustrating my views on the ideal touring car body. Since then they have developed along the lines foreshadowed in the article which accompanied the drawing in question. The result is seen in the design reproduced in Fig. 3.

The general effect is boatlike due in part to the pronounced tumble-in along the top and to the almost horizontal line



Fig. 2—Cyclecar wind wagon made by subscriber

preserved from radiator to cap stern. The domed fenders are attached to the stub-axles instead of to the frame and they follow the movement of the wheels. This arrangement has been tried both here and abroad but some difficulty has been experienced in making the fastenings secure. With this construction the fenders and wheels are concentric and the clearance between them is reduced to the desired minimum. The front wheels do not project partially outside the mudguards and spray mud over the body-work when turns are made. As the sidelights are placed on the fenders, the road to be followed around the curve is illuminated before the turn is actually made. Filaments can now be obtained strong enough to withstand the shocks to which they would be subjected.

Pressed Steel Wheels

Lynton pressed steel detachable disk wheels are used. The chief advantage of this type is the ease of cleaning, the operation being performed thoroughly in 2 minutes for each wheel, a small fraction of the time occupied in cleaning a wire, or even an artillery wheel. While the sides of the pressed steel disk wheels are slightly coned, they do not have the excessive projection which characterizes triple-spoked wire wheels.

There being only two doors the spare wheels are placed diagonally, one on each side, as shown in the plan view. By this arrangement a good distribution of weight is obtained while access to the motor is not rendered difficult—too often the case when a wheel is placed on each side of the hood. The spare wheels are secured by dummy hubs fastened to the body thus doing away with complicated and unsightly carriers and straps. Long running boards have been avoided, a simple step being placed under each door.

Windshield and Radiator Are Pointed

It will be observed that the windshield is pointed, thus harmonizing with the radiator. Vision is not interfered with in the slightest as the junction of the two sections occurs in the center of the dash. Each front seat occupant can adjust his section to suit himself, a feature not to be underrated.

The body sides are very high, 29 inches on the outside. This is rendered possible with only a slightly tapered hood by dropping the frame at the dash. The four individual seats are of the so-called Pullman type introduced by Lamplugh of Paris. Pullman seats, being completely isolated from the sides and back of the body framework, can not only be moved fore and aft but also the angle of inclination of the back can be varied at will. It is needless to dwell upon the great increase in comfort, especially for the driver, possible with this arrangement.

The top, when it is in use folds down into the case and is covered with three detachable panels. Thus is removed perhaps the greatest disfigurement of the modern car. Nothing surely is more ugly than the ordinary folded top with its baggy cover. A compartment is provided behind the rear seats capable of accommodating a large trunk. The rear of the car, therefore, is not spoiled by baggage piled up on a rack.

A few points in regard to the chassis may be worth mentioning. The wheelbase is 12 feet. A six-cylinder Knight slide valve motor of 90 by 150 millimeters (3.5 by 5.9 inches) is employed. A multiple-disk clutch transmits the drive through a four-speed gearbox, direct on high, and a shaft

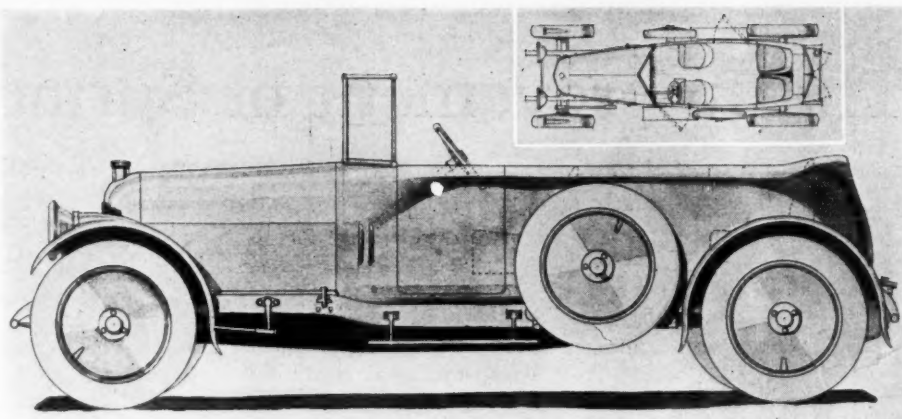


Fig. 3—Ideal car designed by John J. Ide, showing unbroken lines and unusual mounting of the spare tires

inclosed in a torque tube, to the worm bevel drive rear axle.

The back springs, of the Lanchester cantilever type, 56 inches long, are shackled at the rear below the axle permitting a limited sliding motion.

The long diameter of the filler caps for radiator and gasoline tank is a good feature. Replenishing fuel and water takes much less time than with the puny openings generally used.

New York City.

JOHN JAY IDE.

Forty Cars at Importers' Salon

(Continued from page 19)

limousine and a cabriolet. The other two are from Fleetwoods plant. These are a brougham and a four-passenger design.

Two American Makers

Simplex, one of the two American manufacturers who are included in the Salon exhibit, the other being Fiat, is showing four bodies on an improved line of two chassis. There is also a polished chassis. The mechanical changes which have taken place in the Simplex line are not in the nature of changes in specifications but in such details as the timing, shorter intake manifold, higher carbureter, flush cowl board and the use of a driveshaft service brake on the shaft drive models. This is mounted just back of the gearset behind the ball-and-socket universal joint. Some of the body builders' products are shown on White, Packard and Moline-Knight chassis, giving an idea of the high luxury and finish possible with American cars.

The bodies on the Simplex are produced by Quinby and Holbrook. Three of the bodies are mounted on the larger chassis known as the 50, on which either shaft or inclosed chain drive is offered as an option. These are a four-passenger inside drive and a limousine by Quinby, a seven-passenger touring car by Holbrook and on the 38 there is a coupé-landaulet by Holbrook. At the Holbrook stand there are two cars. One of these is a Fiat with a town body. The other is a DeDion eight-cylinder having a body of streamline adaptation in grey-green with an oil finish. This car is fitted with a one-man top.

Three Brewster Bodies

Brewster is showing three bodies. These are an inclosed drive with a collapsible top and a brougham on Rolls-Royce chassis, and a brougham on a Delaunay-Belleville six. The combination of inside drive with a collapsible top is a unique construction giving the advantages of a landaulet and a collapsible. The inside drive feature is in line with a general trend towards favoring this style of body which is exhibited at the Salon. The limousine seems to be losing ground.

The Improvement of Spring Systems--IV

Close of the estimates of shocks and movements in springless vehicles needed for comparing the effects of springs and tires and for passing principal requirements in review

By M. C. K.

(Continued from issue of December 31, 1914)

IN accordance with a modern theory of the schoolroom, to the effect that a subject on which errors of reasoning are liable to occur should be presented not magisterially or didactically but with a plain indication of the mental processes by which the results are reached, two ways of figuring shock and retardation in a springless vehicle were worked out in the issue of last week, and there was an avoidable error in both of them. The nature of it was indicated in a parenthesis, but it had been committed by the writer in first going over the subject, and it was thought useful to follow it up. It consisted in figuring the vertical component of the shock with reference to the kinetic energy of the vehicle and with an allowance for the axle load instead of only from the speed and the axle load. By the discrepancy in the results some readers may have been induced to figure for themselves that the horizontal component was underrated by the first method and the vertical one slightly overrated by the second method. The correction is easily made and gives figures which should be useful for subsequent comparisons.

Final Front Shock Figures

The vertical shock, figured from the velocity imparted to 1,000 pounds, should be approximately 3,180 footpounds (as by first method), and the horizontal component of BA, as figured from the kinetic energy of the whole vehicle and the angle of the impact, should be 8,324 footpounds (as by second method), making a total of 11,704 footpounds abstracted from the vehicle momentum and a retardation of $50 - 8 \times 5.93 = 50 - 47.44 = 2.56$ feet per second.

The blow delivered against the axle, instead of 12,974 — 5,269, is 11,704 — 5,269 = 6,435 footpounds. The tearing stress on the wheelrim remains 5,269 footpounds, but may be considerably modified—also affecting the other figures—if the wheels slip on the obstacle, this possibility being reserved for consideration in connection with tire equipment.

Rear Wheel Figures

With these corrections made, the action of the rear wheels can be figured. As the ability of the vehicle to pick up, by means of its motor power, the speed lost by the front wheel shock before the rear wheels strike the obstacle, depends on a number of factors relating to the efficiency of the transmission and the air resistance which are not vitally connected with the subject, it is assumed that the vehicle continues with the speed it has after the first shock.

The rear wheels thus move against the ridge at 47.44 feet per second. The rise of 3 inches is effected while the vehicle travels 10.53 inches horizontally. It is known that the retardation will be more than 2.56 feet per second, as the rear portion of the vehicle is heavier than the front portion and the obstacle is assumed unyielding, and the average speed over the obstacle can therefore be estimated at one-half of $47.44 + 44.88$, making 46.16, say 46 feet. At the same time the kinetic energy available before the new shock must be figured with a speed of 47.44 feet, say 47.50 feet per second.

This makes the time occupied on the obstacle, and for the load lift, 0.01907 second, from which there is figured a vertical speed imparted of 157.3 inches = 13.11 feet per second—or, rather, a shock equal to the imparting of this speed.

From the formula $h = c^2 : 2g$, giving $13.11^2 : 64$, or 171.8721 : 64 = 2.686 feet, the work involved in such a shock for a weight of 2,000 pounds is the same as for raising 2,000 pounds to a height of 2.686 feet, which is 5,372 footpounds; and this is consequently the value of the vertical shock delivered in 0.01907 second. The horizontal component of the shock is figured as before, being 10.53 : 27.53 of BA—in Fig. 6, taking it as applied to rear wheel—which in turn is 10.53 : 27.53 of the whole energy of the vehicle divided by 2, as before. This energy, $1-2 \text{ mv}^2$, is now reduced to $3,000 \times 47.5^2 : 64 = 105,715$. These values give:

$$\begin{aligned} \text{Mean of BA (rear wheel)} &= \frac{105,715 \times 10.53}{2 \times 27.53} = \frac{1,110,007}{55} = 20,182 \\ \text{Horizontal component thereof} &= \frac{20,182 \times 10.53}{27.53} = 7,706 \end{aligned}$$

The total energy abstracted by the rear wheel shock is thus $5,372 + 7,706 = 13,078$ footpounds, which, deducted from the initial energy of 105,715 footpounds, leaves 92,637 footpounds, giving a speed

$$v_2 = 8 \times \sqrt{92,637 : 3,000} = 8 \times \sqrt{30.546} = 8 \times 5.52 = 44.20 \text{ feet per second.}$$

Out of the total shock of 13,078 footpounds, this value minus $17 : 27.53$ of 7,706, being $13,078 - 4,764 = 8,314$ footpounds, is spent against the rear axle and the remaining 4,864 footpounds tangentially upon the wheelrim. But the wheelrim is moving circumferentially at the speed of the vehicle, and the thrust actually delivered is much complicated by the friction at the point of impact and at the point of previous ground contact of the wheel—both of which the tangential component tends to overcome—and by the motor effort and the rotary momentum of the wheel as such, as well as by possible brake action just preceding the impact, as before referred to. Were it not for the tangential component, the very considerable friction suddenly coming into action at the point of impact might stop the motor of a springless vehicle, while calling for high flywheel momentum if spring and tire actions are weak, especially in the case of slow and heavy driving by which the value of the tangential component of the shock is reduced more than the friction at the point of impact. There is a glimpse here of one of the factors which make heavy motors desirable for heavy vehicles, whose solid rubber tires are not very elastic when worn down, and also of one of the good reasons for driving trucks rather fast over rough cobblestones.

It may in many cases be hard to determine just what becomes of the force represented by the tangential component, but it seems clear that, even if it overcomes the friction of the wheelrim against the ground and the obstacle and causes a grinding motion of the wheel at the point of impact while the vehicle is being raised over the obstacle, such a motion will not interfere sensibly with the other vehicle movements.

From the Ridge to the Ground Level

The distances from the ridge at which the wheels return to the level of the road are of course functions of the speeds, the height of the ridge and of gravitation. Assuming the length of the wheelbase to be 100 inches, the front wheels will be back on the ground before the rear wheels strike the

ridge. The figures will then be as follows: To fall 3 inches takes 0.125 second (see the table, Fig. 2). After the front wheels have passed the top of the ridge the vehicle speed is 47.44 feet per second. At this rate the vehicle travels 5.93 feet in 0.125 second, and the curve described is therefore that shown in Figs. 5 and 6. Similarly, after the rear wheels have passed the ridge, the vehicle speed is reduced to 44.50 feet per second, and the space travelled while they fall becomes 5.56 feet, so that they strike the ground about 41-2 inches behind the point where the front wheels strike.

For completeness it should be added that the shocks received when the wheels return to the ground are relatively insignificant, with a springless vehicle and an obstacle of the kind assumed, the vertical component being of course measured by the height of the fall and amounting to 500 footpounds for the rear and 250 for the front portion of the vehicle. The horizontal thrust against the ground at a very small angle apparently reverts to wheel rotation by reducing the resistance to propulsion.

Shape of the Obstacle Decisive

The shape of the ridge which has been under consideration is typical of one class of road obstacles. If another kind, as that indicated as A_2 in Fig. 7, is considered, the results are found very different. It gives only a mild shock at first, as the approach is gradual, but it makes springless vehicles, as well as those with springs, leap and produces the main shock when they come back to the ground. As the distance from the contact point of the wheel with the ground to the top of the obstruction is necessarily greater than in any case when a blow is struck by the front portion of the wheel against a ridge or hump of the same height, the whole action is milder and less typical of the conditions for the sake of which spring suspensions and tires are used. Consideration of it can therefore be postponed.

Wheel Sizes and Center of Gravity

Among factors which have an influence upon shocks and movements, but nevertheless have been mentioned only incidentally in the foregoing, are the location of the center of gravity of the vehicle, the length of the wheelbase and, especially, the wheel diameters. If it may be shown that they influence vehicles with different spring systems and tire equipments differently, it should be necessary to account for the effects and differences in each case, and it is in fact, perhaps, usually considered that large wheels are more beneficial with hard tires and stiff springs than with soft tires and flexible springs, but the preliminary view is here taken that they are simply more necessary when other means for easing the shocks are lacking. Reserving closer inquiry on these possibilities for the chapter on tire effects and with a view to more rapid progress toward applicable conclusions, it is therefore here assumed that the low center of gravity, the long wheelbase and the large wheel diameter make for smoother travelling in similar degree under all circumstances and that it is sufficient for the comparisons to be made to

figure with these factors as constants, the center of gravity being always such as to bring the total forward thrust in the axle level, with two-thirds of the weight in the rear and one-third in the front axle, the wheels always 40 inches in diameter and the wheelbase always 100 inches. The effects are, however, indicated in part in Figs. 7 and 8.

Avoidance of Pitching

When the vehicle is running at uniform speed, the traction acting at T, Fig. 8, is equal to the resistances overcome in the driving, and the forward thrust to be considered for the front wheel, when it rises over an obstacle, is composed of this driving-thrust in the direction TB and the whole momentum of the vehicle minus the driving-thrust acting in the direction GB. The resultant of these forces may be in the axle level or above it or below it, accordingly as the vehicle is being accelerated or retarded, and with G located as high as shown it is clear that there is always a tendency, when an obstacle is encountered, to increase the load on B and reduce the load on N, as the action of the momentum is in the direction GH. For accelerations the effect is opposite. And these effects are marked if springs permit the body to move with relation to the running-gear, while their effects on the severity of shocks is less noticeable but none the less present in the case of springless vehicles.

That a low center of gravity and also acceleration, bringing the thrust line nearer to TB, reduce the horizontal component of a shock for the front wheels, is apparent from the diagram and is also a matter of practical experience. The long wheelbase, on the other hand, helps in this respect only when the center of gravity is higher than the axle level and most when the momentum is high in proportion to the driving-thrust. The large wheel is always of assistance, as it raises the axle level and usually permits the center of gravity to be located relatively lower.

Load Distribution

The effects of the location of the center of gravity for shocks received when driving backward—which are of some importance for business vehicles, especially heavy trucks—are as much more pronounced as the load here is greater and serve as an argument for the even distribution of loads on both axles, in accordance with the practice already adopted for racing cars and for trucks in which all four wheels are driven.

For a ridge of a given height it is plain that the larger wheel sustains the smaller shock, as the distance, BC, Fig. 7, which it covers horizontally in rising above it is greater than the corresponding distance B₁C₁ of the smaller wheel. While a 40-inch wheel in rising over a ridge 3 inches high distributes the shock over 10.53 inches of horizontal progress, one of 60 inches diameter distributes it over 13 inches of progress.

In the next chapter it will be the object to present a time schedule of the spring action following a simple shock.

(To be continued)

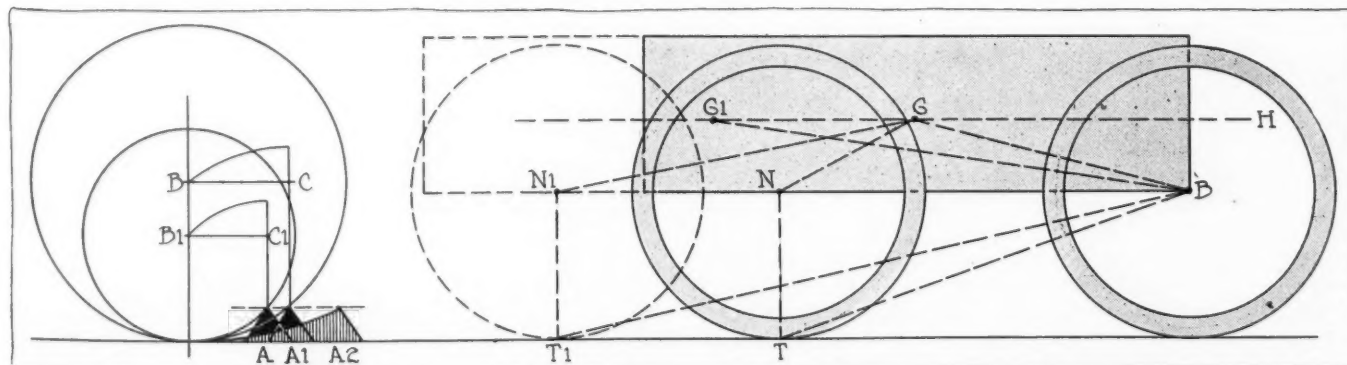


Fig. 7—Illustrating influence of large wheels to smooth the road and help the springs; A_2 type of ridge giving milder shocks than A, A_1 .
Fig. 8—Indicating the forces which cause load level and distribution to influence shocks and spring action. (Line N_1G should be N_1G_1)

New Electrical Equipment Is Feature of Accessories Exhibit

New Motor-Generators and Several New Ford Systems—Refinements in Starters and Generators—Three New Carbureters—Magnetos, Speedometers and Shock Absorbers Show Small Changes

THE greatest development in accessories at the show has been in the starting and lighting field. Several new motor-generators have been brought out for small cars and Fords especially. Some new two-unit systems for Ford machines are also exhibited. Refinement, both in outward appearance and in design, material and finish is found on every hand. The 1915 machine is better looking, more efficient, lighter and better provision has been made for driving. This applies to both starting motors and generators. More attention has been given to voltage regulation, and many other small refinements are noted.

Four new carbureters are exhibited and refinements have been made in several designs carried over. Still others have been put on the market for 1915 without a change. The horizontal connection and double outlet carbureters are noticeable additions.

Little change is found in the magneto field. Few new models have been brought out. In ignition the timer-distributor is gaining favor and several makers are exhibiting these in unit with the generator for the first time.

Some new models are also noted in the shock absorber and speedometer classes, but in the main the lines are much the same as last year.

Gray & Davis

A brand new Ford starting and lighting system has been brought out by Gray & Davis, Boston, Mass. It is a single-unit system of the motor-generator type and supplants the unit system for Fords announced a few weeks ago. This is a radical departure for this concern, which has heretofore made only two-unit systems. The price is \$75.

In addition two new generators and a new starting motor are exhibited. The generators are entirely new designs and are of the variable speed type, instead of having a constant speed governor drive as heretofore.

Y-shaped pole pieces also distinguish these machines as well as the new starting motor. The latter is for all but large cars. For bigger machines, a starting motor continued from last year is offered.

In the Ford system provision is made for mounting the motor-generator on the left of the motor. Like all Gray & Davis systems it is a 6-volt design and the outfit includes a battery, indicator for dash regulator, cutout, switches, wiring and all the necessary connections. The drive is by an inclosed silent chain.

Kemco Generators and Motors

The Kemco line has been enlarged so that it now includes starting motors and generators of different types, as well as the original generator which is associated with the Kemco name. The 6-volt system is used in all units.

The complete line consists of four starting motors of graded sizes and for different powered motors. There is a universal starting motor which is designed especially for cars already in use. It is mounted in front of the radiator, taking the place of the starting crank. The reduction gears are contained in the starting motor casing. A smaller edition is made for Fords, and in connection with a fan generator makes a complete starting and lighting system.

Separate generators of 10 and 15-ampere capacity are also offered. These machines differ from former Kemco practice in that they are entirely separate from the fan. They are cylindrical in shape, and voltage regulation is by means of a Ward Leonard combined regulator and cutout. Another generator is a belt-driven type which resembles the fan generator, except it has no blades. These machines are made by the Kemco Electric Co., Cleveland, O.

General Electric Genemotor

The General Electric Co., Schenectady, N. Y., large makers of motors and generators and other electrical apparatus, has brought out a 12-volt motor-generator known as the Genemotor. The machine is designed especially for Fords and sells complete without lamps for \$80. A. J. Pickard & Co., 1720 Broadway, New York City, is the sole distributor.

The Genemotor is mounted on the left side of the motor. The drive is by silent chain from a sprocket on the crankshaft. The instrument is cylindrical in shape and may be attached without drilling or tapping of holes. The regulation of the charging current for the battery is accomplished without the use of external regulators, the field windings of the Genemotor itself giving the regulation. The motor starting switch is mounted on the top of the machine, and is actuated by a push rod on the dash. The cutout closes at 9 miles per hour.

Apico Starting and Lighting

The Apico line is replete with new features. There is an entirely new motor-generator, built in three sizes, one of these being used in a special Ford installation. In addition there is a separate starting motor and two generators.

The motor-generators are known as the A-25, A-27 and A-28. The standard voltage for starting is 12 and for lighting 6, the change from one to the other being accomplished by a series-parallel switch.

The Ford motor-generator is mounted on the left of the motor and is driven through a silent chain. The voltage regulation is inherent and there is a cutout on the dash which registers ON and OFF.

One of the generators is designed for small machines, and will furnish 5 amperes at 6 volts. The normal driving speed is 1,600 revolutions per minute and the drive is ordinarily by chain. Another generator, known as the S.R.-2, is designed to run at twice engine speed, and will give a 7-volt current of 10 amperes. This unit is also made with a special head containing a timer and distributor. A feature of this combination is that the generator may be removed for repairs without influencing the operation of the ignition system.

The starting motor is designed for small and medium-sized motors, and drives through the flywheel. The feature of the machine is the automatic releasing gear which disengages the gear and opens the switch when the engine starts, even though the foot is on the starting pedal.

Westinghouse Motors and Generators

The feature of the Westinghouse line is a motor-generator. Refinements are found in the other units. The motor-generator is a 12-volt machine, and in this respect differs from former practice. It is permanently geared to the engine.

No cutout switch is used, and at low engine speeds the generator therefore automatically becomes a motor, so that in case the engine is stalled it is automatically started.

Starting motors and generators, both with and without ignition units, are continued with slight refinements.

Northeast Motor-Generator

A single machine for starting and charging the storage battery, made in but one model, is exhibited by the Northeast Electric Co., Rochester, N. Y. There are, however, several different methods of application so that it may be used on any car. For larger cars the system operates on 24 volts while the smaller cars use 12 volts. For old cars a universal system of application has been brought out, the motor being mounted in front of the radiator. Special fittings are also made so that the system may be attached to the Ford. No reduction in size has been made but the efficiency and torque have been improved and a more efficient regulating device is fitted.

Bosch Starters and Generators

Four sizes of motors and two types of generators in sizes to suit the individual manufacturer make up the line of the Bosch Magneto Co., New York City.

Practically no changes have been made in any of the models and they may be considered as continuations of the 1914 series. The latest addition is the Model D starting motor which was announced some months ago.

Both starting and lighting machines are built in both 6- and 12 volts and with single or double wiring. Two types of lighting generators are manufactured. One, a constant voltage design which goes under the Bosch name and the other a constant-current and constant-voltage machine, known as the Bosch-Rushmore.

Dyneto Motor Generator

Two motor-generators are made by the Dyneto Electric Co., Syracuse, N. Y. The model A is a new one designed for small-bore motors and the B is continued from last year. No radical change has been made in these instruments. The generator has been improved so that it begins to charge at a somewhat lower speed. Twelve volts is standard although other voltages can be supplied.

Leece-Neville Systems

Ten cranking motors, three generators and six motor-generators are shown by the Leece-Neville Co., Cleveland, O. Improvements consist in a more rugged construction of the inner parts. Six 12- and 24-volt systems are built and double wiring is standard.

Hartford Ford System

A high-speed starting and lighting system for Fords is shown by the Hartford Suspension Co., Jersey City, N. J. Motor and generator are separate units, the generator being mounted horizontally and the motor vertically, drive being from the front of the generator through a worm gear. The generator runs at approximately twice the speed of the crankshaft with which it is connected by means of a chain. The motor operates at a speed of from 8,000 to 10,000 revolutions per minute. The advantage in the high speed is that low weight is secured. The whole system weighs 54 pounds, it is said.

The cranking speed is about 300 revolutions per minute, and the voltage is 12. The price is \$100, complete except lamps.

A new electric starting and lighting system designed for application to old cars is shown by the Chicago Electric Specialties Co., Chicago. Special fixtures are supplied for attaching the outfit to different makes of cars, the Ford attachment being the one pushed at present. The same unit

is employed for all. This is a 6-volt motor-generator and is driven by silent chain from the front of the crankshaft.

An unusually attractive feature is the combination of a tire pump with the unit, in such a way that the starting, lighting and tire inflation are accomplished by the same instrument. The outfit for the Ford costs \$80 with \$15 additional for the pump.

Brown-Lipe Starting Gear

An entirely new and original type of starting gear, which is mounted at the side of the gearset and which drives through the clutch, has been developed by the Brown-Lipe Gear Co., Syracuse, N. Y. By the movement of a heel pedal the gear is first meshed and the switch closed. This is accomplished through a very simple mechanical arrangement. The rod running down from the pedal is pinned to a cross arm whose ends are pinned to the rod which meshes the gear and the rod which closes the switch, the latter two being at right angles to the former. The gear rod is held out of engagement by a comparatively light helical spring, and the switch rod is held out by a spring several times this strength. Also the rod extending down from the heel pedal is pinned to the cross arm nearer the gear rod. The result is that when the heel pedal is depressed the weak spring is compressed its full amount before the stiff spring is deflected appreciably, so that the gear is fully meshed before the switch rod is moved. Further depression of the starting pedal also compresses the stiff spring and closes the switch.

Jackson Ford System

A lighting generator for Fords is exhibited by the Charles A. Jackson Co., Park Square, Boston. It is mounted on a special bracket and is driven by a wide belt which also drives the fan. Its weight is 9 pounds and it gives 8 amperes at 7 volts at a normal speed of 1,800. It is equipped with a cutout. The price is \$15.

Bosch NU 4 Magneto

Two new models of magnetos are shown by the Bosch Magneto Co., 225 West Forty-sixth street, New York City. One is the NU4 which was described in THE AUTOMOBILE some time ago. It is for motors of 30 horsepower or less and sells for \$40. The usual distributor is eliminated, distribution of the high-tension current being effected by a double slip ring with metal segments which carry the current to the four brushes, connected to the four plug leads. This model is part of a new Ford outfit equipped with gear drive. The secondary winding is carried to the slip ring. The other new Bosch product is a vibrator system designed to make starting easy in cases where the cranking speed is low and the spark weak. The older Bosch magnetos are continued unchanged.

Splitdorf-Cunningham

An entirely new model, the Cunningham, is shown by the Splitdorf Electrical Co., Newark, N. J. It is a water-proof, high-tension instrument and is designed to produce a hot spark at very low speeds. It has a timing range of 75 degrees. The threaded hole spacing and the distance to the tapered driving shaft conform to S. A. E. standard. The interrupter is not new, however. The other Splitdorf magnetos are practically unchanged.

M. F. Carbureter

A new carbureter of unusual design in that the float chamber has been discarded, one that is simple and light is the M. F., manufactured by the Floatless Carbureter Co., 102 Jefferson avenue, Brooklyn, N. Y. The main air inlet is at the bottom and to one side. At slow speed the air rushes up through this passageway, past the spray nozzle, lifting a small disk which is attached to the needle valve. When the motor is idle this valve is forced closed by a flat spring but when the motor is running, the suction raises the disk and

allows gasoline to flow out of the nozzle, the amount depending on the height of the disk.

Shakespeare Carbureter

There are no springs in the new Shakespeare Carbureter made by the William Shakespeare, Jr. Co., Kalamazoo, Mich. The float is concentric and the flow of gasoline from the fuel nozzle is regulated by a movable needle which is attached to a floating disk. Increased suction raises the needle and allows more fuel to flow and at the same time the raising of the disk increases the annular opening, allowing more air to flow.

Stromberg Carbureters

The two Stromberg models which were recently announced in *THE AUTOMOBILE* are on exhibition. One is the K which is featured by a balanced air valve construction which takes the place of the auxiliary air valve. The other is the H and it is notable in that it uses a dash-pot control of the air valve. It also has a secondary jet. Models B, G and C are continued.

Parkin Carbureter

The carbureter which is exhibited by the Light Mfg. & Foundry Co., Pottstown, is known as the Parkin. It has no springs and there is but one air inlet. The mixture is regulated by a special type of throttle valve and a single jet whose opening is controlled by the position of the throttle. Easy starting is provided by means of a choke valve in the air intake.

Rayfield Carbureters

Rayfield carbureters are shown in two types, the G and the L. This is the first time they have been exhibited, as they have been brought out since the last show. The two types are identical except that the G is water-jacketed. Both models are of the two jet type, and there are three air openings, one fixed and operating in conjunction with the low-speed nozzle and the other two having automatic valves linked together and opening simultaneously.

Zenith Carbureter

In addition to its two standard makes the Zenith company has added a new type designated as model O, which is built for the small car trade and sold at a lower price although retaining standard Zenith features. Double outlet carbureters for eight-cylinder motors are shown.

Browne Carbureter

The Browne carbureter, for which the Holt-Wells Co., 1790 Broadway, is selling agent, is a newcomer in which the principal feature is a vacuum-controlled auxiliary air valve by which a constant ratio between the fuel and air is maintained. Only one size of carbureter is made for all makes of cars and the only change for different motors is to put in a new bushing which surrounds the auxiliary air valve and controls the area of the auxiliary air opening. Large motors use bushings with more sharply outcurving surfaces than small ones.

Van Sicklen Speedometer

The Van Sicklen speedometer for Ford cars is the feature of this company's exhibit, made this year for the first time. Other interesting features are a new swivel drive to the front axle spindle of the Ford and a back-of-the-gearset drive by a stamped worm for other cars. The most unique feature of the new instruments is the new black-faced dial with internal lighting.

Corbin-Brown centrifugal speedometers for 1915 are shown with a new feature, a selective trip reset on the odometer by which it is possible to set the trip wheels at any mileage. An-

other point is the arrangement of the trip odometer wheels on the same spindle as the season wheels, leaving a clean dial.

Formerly Elyria-Dean, Garford speedometers are little changed, but several new flush types have been added.

Standard Speedometers

Standard speedometers have been added to by the introduction of a Ford model. This model is used on Ford cars shipped from the factory as special equipment, bearing the Ford trade-mark. But this mark is not used when sold through dealers.

The Hoeffcker-Evans speedlock instruments have been changed this year. Last year the speed lock served to interrupt the ignition when the speed exceeded a set maximum. This year, however, the governor acts on the throttle-control rod.

Waltham Truck Clock

The necessity for operating trucks on schedule has led the Waltham Watch Co., Waltham, Mass., to bring out a special truck clock. It is theft and water-proof and cannot be set without a key.

Stewart Self-Winding Clock

The latest Stewart accessory is the 1-year self winding electric clock. It is a flush type and carries a small dry battery at the back. The clock driving mechanism consists of a short coil spring. A contact maker closes the battery circuit once every 2 minutes, the current energizing a magnet whose armature rewinds the spring. A feature of the booth was the demonstration of the vacuum gasoline system, the exhibit consisting of a portion of a motor car chassis with the system installed. In addition a glass model is mounted at the top of the engine, a red fluid being used to represent gasoline. The motor was constantly turned by an electric motor and the pumping action of the suction tank was strikingly demonstrated.

Triple-Action Shock Absorbers

Two new models have been developed by the Triple Action Spring Co., Chicago, Ill., one for electric cars and the other for trucks. In both cases the new feature is the addition of a third coil.

A new model has been brought out by the Universal Shock Eliminator Co., New York City, in which the coil spring is unusually long and large. It is inclosed in a vertical casing designed to be mounted at the front end of the leaf spring.

A feature of the Hartford Suspension Co.'s exhibit is the new multiple-disk friction shock absorber which automatically increases in stiffness according to the severity of the blow. This was fully described in a recent issue of *THE AUTOMOBILE*.

Two types of spring shock absorbers are exhibited by the Cox Brass Mfg. Co., Albany, N. Y. One is a Ford design selling for \$8 per set of four, or \$4.50 for two, and the other is for larger cars and sells for \$10 per set of four. Both types use two helical springs suitably inclosed and both are attached in place of the spring shackles.

Two new models have been added to the line of bumpers made by the J. H. Sager Co., Rochester, N. Y. Both feature a method of passing the bar to the arms. The bar is of channel form, the flanges being turned inward. The two models differ in that one is adjustable to any frame while the other is for attaching to a number of standard cars.

The latest Grossman bumper for Fords is designed to provide substantial attachment and also to improve the appearance.

Along with the shock absorbers proper, the Dann Oil Cushion Spring Insert Co. has developed a spring, in which much of the shock is said to be eliminated by constant lubrication between the leaves. This is accomplished by making up springs for the trade, with the oil inserts in place. The

lubrication also lessens the liability of spring breakage.

A similar effect is the object of the Brown Oilbox which offers an easy means of feeding oil between the leaves.

Champion Spark Plug

A new Champion spark plug with a one-piece porcelain is the feature of the Champion line. The new plug consists essentially of two pieces, the shell and the large, thick porcelain insulator in which is cemented a heavy center electrode. The points of the spark plug are constructed from a special nickel-manganese steel alloy, which has high heat-resisting qualities. The price is \$1.25.

A new spark plug has been brought out by the Brown Co., Syracuse, N. Y. It is a conventional design with a porcelain insulator. It is made in .5-inch, metric and A. L. A. M. sizes and the price is 75 cents.

A special plug for Ford cars is made by the V-Ray Co., New York City. In addition plugs are made for all other cars.

The Benford Mfg. Co., Mount Vernon, N. Y., is showing a Monarch special Overland plug which is the same as the other plugs except that it has a long shank. The price is 75 cents.

Charles E. Miller has brought out a porcelain spark plug listing at 50 cents. It has a blue steel shell and two-point electrode.

Stanweld Rim

A new Stanweld rim made its debut at the show. Its chief points of difference are that the side flanges once applied to a casing remain permanently with it as long as it is used, not being removed in changing tires. These rings are not split. The felloe band has but one bevelled face, that to the rear. The rim is simpler than previous types.

Parker Steel Wheel

Parker pressed steel wheels made from two sheets of metal welded together after pressed to shape, was the feature of the Hydraulic Pressed Steel Wheel Co., Cleveland, O. Advantages claimed are lightness and the elimination of the ordinary felloe band, the rim of the wheel taking the place of the former.

Designed for the purpose of enabling any car which has broken any of its four axle spindles to be towed to the nearest repair shop, the Autorescue made by the Autorescue Mfg. Co., Streator, Ill., consists of an arm which is clamped to the axle and carries the wheel spindle.

Shaler Roadside Vulcanizer

Two new Shaler vulcanizers are on display. One is for tubes and the other for tubes and shoes of Fords. They are designed for roadside work. The correct amount of heat is obtained by a lamp which burns gasoline or alcohol. The price is \$2. The Ford is \$2.75.

Brown Vulcanizer

A new vulcanizer has been brought out by the Brown Co., Syracuse, N. Y., which is based on a new principle. The device consists of a stove in which is placed a vulcanizing iron. The heat is supplied by the combustion of gasoline or alcohol. When the charge of fuel has burned itself out the iron is hot enough to begin vulcanizing and is clamped over the part to be repaired.

Dayton Pneumatic

A pneumatic tire is exhibited by the Dayton Rubber Mfg. Co., Dayton, O. This concern is continuing its airless tire. The pneumatics are guaranteed for 5,000 miles.

Economy tubes are the new product exhibited by the Du-jardin company, 1697 Broadway, New York City. These tubes are said to be proof against blowing out, pinching or

rim-cutting. They consist of an extra-heavy red tube reinforced by a knitted stocking of Sea Island cotton.

The Marathon Tire & Rubber Co., Cuyahoga Falls, O., through its New York agents, is showing a new non-skid tread consisting of a number of V-shaped rubber projections distributed evenly over the tread at varying angles.

A newcomer in the tire field is the Gordon Rubber Co., Canton, O., maker of Gordon tires. The feature of the line is the triangle tread. This is a non-skid design with a triangle-shaped raised portion.

D-M Anti-Skid Traction Treads

D-M anti-skid traction treads are designed for solid dual tires and are made by the Dayton Malleable Iron Co., Dayton, O. They are made from malleable iron. Each tread consists of a flat surface with a ridge to prevent skidding. The flat surface rests against the tire. These different units are connected by means of hook and eye joints.

Manzel Motor-Driven Pump

A single-cylinder, air-cooled, gear-driven tire pump for Ford cars is a new offering by the Manzel Bros. Co., Buffalo, N. Y. It is priced at \$7.50 complete with steel gears, 12 feet of air hose, a pressure gauge, and everything for immediate installation. It will inflate a Ford tire in about 1.5 minutes and it can be installed in 45 minutes. It is mounted above the crankshaft and to the left and is driven by a gear.

Another Manzel model is a two-cylinder design which sells for \$20. Fifteen feet of hose, pressure gauge and air filter are part of the equipment. It may be installed without difficulty on almost any make of car as special fittings are made for all the prominent makes now in use.

Sanford Single-Cylinder Pump

A new motor-driven tire pump is shown by the Brown Co., Syracuse, N. Y. It is called the Sanford and sells for \$8.50 complete with gear, hose and gauge. It is suitable for tires up to 34 by 4 inches and will inflate a Ford tire in 1 minute. A four-cylinder garage pump is also new. The feature of this device is the placing of the cylinders at 90 degrees and in the same plane. It is electric driven.

Kellog Pumps

Four new garage pumps feature the line of the Kellog Mfg. Co., Rochester, N. Y. In addition a combination tire pressure gauge and air purifier has been brought out and minor improvements are noted in the line of motor-driven tire pumps which are made with one, two and four cylinders.

One garage pump which is a portable type is completely inclosed in a sheet metal casing, keeping the working parts away from the dust. It is a complete unit containing a motor, air-compressor, storage tank and automatic electric cutout.

Mayo Pumps

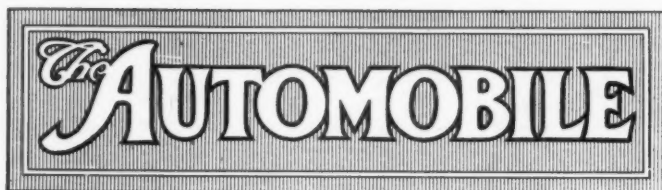
Several pumps and pump accessories are on view at the booth of the Mayo Mfg. Co.

The most recent design is the valve cap pump, which is operated by the compression of the motor, but instead of screwing into the spark plug opening is permanently attached to a valve cap. It sells for \$15 complete with equipment.

In addition there is the spark plug pump and also a special type for Fords, the former sells for \$10 and the latter for \$8. There is a special two-cylinder garage pump as well as foot pumps and gauges.

Hartford Single-Cylinder

The Hartford Machine Screw Co., Hartford, Conn., has introduced a single-cylinder pump. The two-cylinder model will be continued. The single will inflate a 34 by 4 tire to 80 pounds pressure in 2.75 minutes. It is gear driven.



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Recognition

THIS week's Grand Central Palace automobile show once more demonstrates that the interest in shows is not waning, an increased paid attendance of 22 per cent. on opening night, over the corresponding night of a year ago, being convincing proof of this. The last 18 months have demonstrated that we are far from arriving at that point in automobile engineering where the road lies straight to the eventual goal. Two years ago some few imagined the eventual had arrived, and that shows would practically cease so far as new interest was concerned. But what false prophets they were, as this year evidences more real engineering activity than any year for some time. And you do not have to go around with the microscope to find many of the improvements.

The present period, due to the great European war, is epochal in American automobile design, in that Europe is bound to take more notice of our activities than heretofore. Unfortunately our status of design has not been so high in continental eyes as could be desired. Our early racing attempts abroad did little to engender respect, and those early memories are still green in the minds of many Europeans. They have not given due credit for what has been accomplished on this side of the ocean. Few of their engineers have seen at first hand our fac-

ories. The war is bringing them to our shores and on every hand are heard wholesome comments on the amazing improvements that Americans have made. While production has absorbed much of our energies still design has been carried along. With this situation confronting us, we can look to much closer scrutiny of our designs from Europe, and the good that is in us will not be so hidden under a bushel as in the past.

Engineering Character

EUROPE, which is always slow in co-operative activities, has at last generally acknowledged that the standardization of work, which the Society of Automobile Engineers has been carrying on in America for several years, is most valuable to the automobile industry, and that the Old World countries have not been progressing rapidly enough in this work.

Two years ago a few score of American engineers still believed that the work of the standard committee had in mind the eventual elimination of the engineer, and that car efficiency was being injured by the aggressive work of the various standard committees. Fortunately many of these engineers have been made converts within the last year, and today they are loud in praising the standardization work, now that they see the true object of it, namely, to take needless routine off the shoulders of the engineer, to give him satisfactory materials to work with at lower costs, and to make it possible for him to purchase materials and parts suited to his needs, without long waits for deliveries.

The past year has been a red-letter one in this work, and the various committees at their quarterly sessions have worked on a schedule which has heretofore been wanting. Today this work is more up-to-date than at any previous time, in fact, the work is keeping in step with manufacturing, as shown by the standardizing of flanges for horizontal type carbureters which are just coming on the market. It is of invaluable advantage to both carbureter and motor makers to get these standards settled before manufacture has progressed very far.

What has been done is but the entering of the thin edge of the wedge. Standardizing these flanges does not improve the gearset design of the poor maker or impair the design of the good manufacturer. Standardizing this design is not going to rob one of business and give it to another. These standards not only evidence breadth of intellect in the engineering field, but also point to a most deserving spirit of progress in the manufacturers of such parts. This widening of the views of individuals, individual concerns and groups of concerns, is one of the most considerable indications of the great broad work that the standards committee is accomplishing; and when we compare these accomplishments with kindred work in other industries we can only reach one verdict, namely, our Society of Automobile Engineers is setting a high-water mark in the international engineering field in this work.

VanDervoort President of S. A. E.

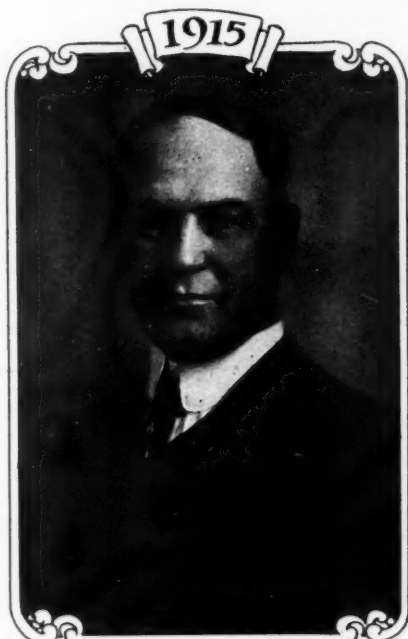
Elected with Full Ticket at Annual Meeting Today—Ex-President Souther Made Life Member—Nine Tire Sizes Considered—Side-Outlet Carbureter Fitting Standardized

NEW YORK CITY, Jan. 6—W. H. VanDervoort, president of the Moline Automobile Co., is the new president of the Society of Automobile Engineers. The other officers elected were: F. R. Hutton, first vice-president; J. A. Anglada, second vice-president; A. B. Cumner, treasurer and C. B. Rose, Velie Co.; John Wilkinson, Franklin Co.; W. P. Kennedy and F. M. Germane, Standard Roller Bearing Co., councillors.

The Value of Training

President Leland opened the meeting with an address on the work of the society and the future of automobile engineering. His theme was the value of training men who could truthfully say that they "knew how." He dwelt on the value of producing engineers who turn their attention to the production end of automobile manufacture. He stated in his address that the decreasing number of concerns would leave more trained engineers free to take up the work of production engineering.

The treasurer's report which was read by Coker Clarkson, secretary of the Society, covered the finances from October 1 to December 1, 1914. It showed the total receipts to be \$21,758.48 and the disbursements to be \$16,253.22. The new members elected since the last meeting



President W. H. VAN DERVOORT
Society of Automobile Engineers

take into account those which have entered under the new constitution. There have been added to the Society's list thirty-two members, twenty-three associates, six juniors, one affiliate, five af-

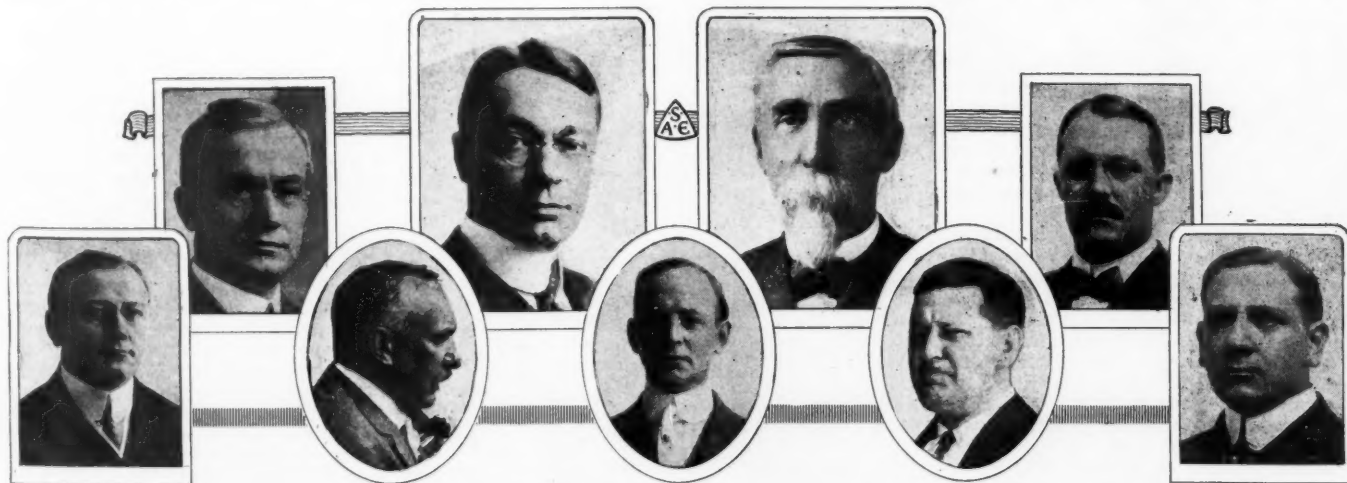
filiate representative and eleven student enrollments.

Souther Elected Life Member

Henry Souther was presented the silver tray shown yesterday at the Standards Committee meeting and was also elected a life member of the Society in token of appreciation for the work he has done as chairman of the Standards Committee.

The professional part of the meeting this morning was taken up by report of the ball and roller bearing division and the report of the division on carbureter fitting. The ball and roller bearing report was one of progress. A data sheet showing the size of roller bearings has been drawn up and will be submitted to bearing manufacturers for their approval. In addition a table of proposed end thrust bearings is being arranged in which it is hoped to reduce the number of sizes to one-third the present number. This sheet will be sent out shortly. There was no discussion on the report of this division.

The report of the carbureter fittings division as described later under the head of the standards division report of yesterday, was next taken up. This was adopted without discussion. The result of this report will provide a standard fitting for side outlet carbureters which



Vice-presidents and Council of S. A. E. for 1915, the men in control for the next 12 months. Upper row from left to right: Christian Gird, Perfection Spring Co., Cleveland, O.; Howard Marmon, Nordyke & Marmon Co., Indianapolis, Ind.; Henry M. Leland, Cadillac Motor Car Co., Detroit, Mich.; William P. Kennedy, Consult. Engr., New York City. No photograph was available of F. R. Hutton.

Lower row from left to right: F. M. Germane, Standard Roller Bearing Co., Phila., Pa.; Walter C. Baker, American Ball Bearing Co., Cleveland, O.; A. B. Cumner, Transportation Engr., New York City; Ernest P. Clarkson, Civil Engineer, Toronto, Ont.; Joseph A. Anglada, Consulting Engineer, New York City.

Dr. Moldenke,
Watchung, N. J.Ferdinand Jehle,
Com. Eng. Lab.C. W. McKinley,
Willys-Overland Co.A. Ludlow Clayden,
Inst. A. E. of Gt. Br.A. K. Eher,
Overbrook, Pa.G. W. Houk,
Houk Mfg. Co.

will correspond almost directly to that of carbureters using horizontal flanges for attachment to the intake manifold.

All of Tuesday the standards committee spent arranging the array of standardization factors which will be presented before the meetings of the society as a whole on Wednesday and Thursday. More than seventy were in attendance. The reports of twelve divisions were heard and the reports threshed out at the Tuesday meeting indicate that the winter session of 1915 will close with much accomplished.

The business of the committee meeting is summed up by the reporting of the twelve divisions devoted to different features of the standardization work, the creation of a new division for the purpose of investigating the possibilities of standardizing the sprocket wheels used in connection with silent chain drive of the timing gearset and the exhibitor of a silver tray to be presented to Henry Souther, chairman of the standards committee, by his associates in recognition of the valuable work he has accomplished during his three years of service, from 1910 to 1914. Mr. Souther's most important work has been in connection with his devotion to the subject of S. A. E. standard steels, which have become recognized by engineering bodies throughout the world.

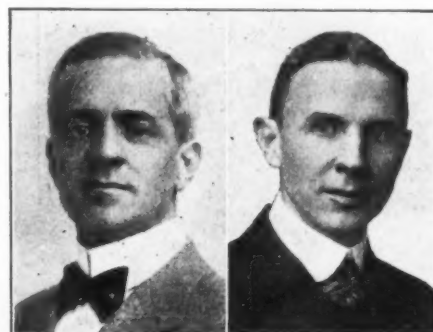
The twelve divisions which have brought the results of their research work before the standards committee, and which will have their reports threshed out in the general meeting, are those dealing with electrical equipment, iron and steel, frame sections, lock washers, carbureter fittings, miscellaneous fittings, ball and roller bearings, electric vehicles, standards exchange, pleasure car wheels, springs and nomenclature.

If the results of the reports of the divisions are what would be expected from the various reports before the standards committee the following good will have been accomplished:

The methods of wiring and insulating the single wire and double wire starting and lighting systems will be clearly defined and the nomenclature of these two systems will be changed to the grounded-return and the insulated-return systems, respectively. Fuse ratings for these systems will be clearly outlined and the method of constructing fuse clips, battery retainers and lamp fittings will also be definitely outlined.

The list of S. A. E. steels will be augmented by the outlining of a set of physical characteristics to which the engineer can work if he so desires, rather than merely to the chemical formulae heretofore supplied. There will also be two silico manganese spring steels instead of one.

Frame dimensions will be so laid down

Alden L. McMurtry,
Consult. EngineerDavid L. Gallup,
Worcester Poly. Inst.Chas. B. Whittelsey,
Hartford R. W. Co.Walter T. Fishleigh,
Univ. of MichiganR. M. Mudge,
Hayes Wheel Co.C. T. Myers,
Mech. EngineerHenri G. Chatain,
General Electric Co.C. W. Spicer,
Spicer Mfg. Co.

that future designs may follow a definite recommended practice, insofar as the radius of curvature at the frame ends, the depth and the amount of drop is concerned.

The number of lock washers will be reduced much in the same manner that the number of steel tubing sizes were some time ago. Certain lock washer sizes will be made to conform to several sizes of nut.

The method of attaching side-outlet carbureters will be standardized in the same manner as those using the horizontal flange.

Pins for rod and yoke ends will be standard, the list of S. A. E. screw thread sizes will be carried above 1.5 inch to more than 6 inches, and the number of fan belt widths will be reduced to three definite sizes instead of the large number of indefinite widths now used.

A list of standard roller bearing sizes will be submitted to manufacturers for their acceptance and then turned over for adoption by the society.

Electric Vehicle Formula

A definite standpoint from which to judge the performance and capacity of electric vehicles will be adopted. A standard type of name plate will also be fitted to each type of motor.

Bell housings that will be suitable for all makes of unit power plants will become standard. These bell housings are continuations of a standardized crankcase end, and include the flywheel and the gearset.

Tire sizes will be reduced to nine regular sizes with nine over sizes. This is a continuation of the work that has been going on during the past year.

Cantilever springs will be classified and receive a definite nomenclature, and spring bolts, clips, nuts and fittings will receive standard dimensions.

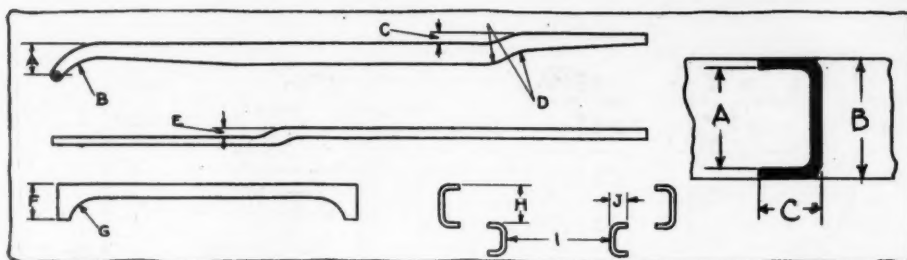
Car parts will be arranged in a logical sequence to facilitate the nomenclature and proper listing of parts for parts catalogs.

Electrical Equipment Division Reports

The electrical equipment division made, among others, the following recommendations, the report being read by Joseph Bijur, of the Bijur Motor Lighting Co.

The division has received from its subcommittee an interim report submitting data as to ordinances in forms and headlights dimming devices approved by various municipalities. The division feels, however, that no specific recommendation should be made by it at this time as to a definition of glaring light.

The subcommittee on bulb bases, sockets and connector plugs has recommended that an additional drawing, with dimensions showing details of the connector plug, be added to the S. A. E. data sheets. Also an end view of the socket,



Dimensions which will be standardized on frame side members if the standards committee work is carried through

showing the exact location of the bayonet lock slot and detail dimensions of same.

The sub-committee has further recommended that bulb bases and connector plugs be made to interchange in the same sockets.

It is recommended that the systems of installation commonly known as the "two-wire" and as the "single wire" systems be termed respectively "insulated return" and "ground return" systems.

Any installation in which (apart from ignition) the chassis frame or bare metal is used as part of the return circuit, shall be considered as a "ground-return" system.

Insulated conductors must be protected by metallic or non-metallic conduit outside of the insulation, except where otherwise protected from the elements, or where out of contact with metal surfaces. Such locations are inside of the body or on wooden dash and instrument boards, or extending in a straight line between chassis and lamps.

The ends of all conduit where exposed to weather, must point downward, so that water will run out of, instead of into the conduit.

Where metal conduit is led to a connector, it must be securely soldered, or permanently clamped to the plug; either inside or outside of a sleeve not less than .25-inch long.

Where wires are not protected with conduit, or they are to be cleated at intervals not exceeding 10 inches, such cleats may be of metal with a layer of insulation interposed between the cleats and wire.

Fuses must be of the enclosed type, constructed so that inspection can show whether or not they have been melted.

Fuses should be marked with their rating.

Standard fuses shall be 1 1-4 inches long over all, with ferrules 1-4 inch in diameter; or 1 1-2 inches long over all, with ferrules 13-32 inch in diameter.

It is recommended that fuses of 10-, 20- and 30-ampere ratings be used.

Fuse rating and temperature rise shall conform to the specifications of the National Board of Fire Underwriters, which are revised from time to time, usually every two years.

C. W. McKinley, chief engineer of the Willys-Overland company, questioned if the glass type of fuse would fall within the measurements given by the committee. He stated that the glass fuse was in common use and should be considered. Mr. Bijur stated that the glass fuse had been considered by the committee in making up their report and that he thought the glass fuse would fall into the dimensions given.

R. McA. Lloyd brought up the point that the matter should not go beyond recommended practice as conditions are changing too rapidly to standardize this part of electrical equipment. Mr. Bijur

replied that the idea of the committee was merely to recommend this as good practice. W. G. Wall, engineer for the National company, stated that he doubted the practicability of the glass fuse and favored the mica. Mr. Bijur replied that the specifications did not require only the transparent type of fuse but that others also could qualify for use.

Alden McMurtry mentioned that horizontal fuses of a small size are apt to reclose the circuit on melting, and that he would advise a vertical installation. K. W. Zimmerschied, metallurgist General Motors Co., stated that the rating and not the outside dimensions of the fuse should be the determining factor. Mr. Bijur also stated that the size could be anything desired as long as the rating is correct. He stated that the largest size given in the report of the division is large enough for any installation.

The report of the Iron and Steel division was read by K. W. Zimmerschied. It has not as yet been published but goes into the matter of physical specifications of the S. A. E. steels. It is not the idea, as Mr. Zimmerschied brought out in his report, to have the engineer who is using the physical specifications furnish the steel manufacturer with both the chemical and physical analyses of the steel he requires. He may use one or the other but not both as it would seriously handicap the steel fabricator to have to overcome difficulties that the engineer would never foresee.

The idea of the report is two-fold: First to give a definite idea to the engineer using the steel as to what can be expected from each chemical analysis and secondly to protect the steel manufacturer against unreasonable demand in physical analyses of definite steels. At the present time curves of the physical characteristics of the carbon steels have been made and data sheets will be issued before the end of the month. The specifications for S. A. E. chrome-nickel steel have been altered in chromium percentage and two silico-manganese spring steels take the place of one allowing a greater freedom in the silicon and manganese fractions.

In response to a question by W. G. Wall as regards the definite characteristics of the new silico-manganese steels it was pointed out by Mr. Zimmerschied that one allows from .45 to .55 carbon and 1.80 to 2.10 silicon and the other from .55 to .65 carbon and 1.55 to 1.80 silicon. This satisfies the advocates of both schools: High carbon with low silicon and low carbon with high silicon.

The frame section report is summed up in the accompanying illustrations herewith and the table of dimensions which accompanies it. The report was read by J. G. Perrin, who was chief engineer of the Lozier company. It is a continuation of the report of the committee made at the last meeting but the amount of drop has been increased on account of

the growing tendency to flatten the front spring. A letter from A. L. Riker, engineer of the Locomobile company, showed that he acquiesced in practically all the dimensions. The dimension D, in the drawing was the only one he thought impossible for his concern to use.

Walter M. Newkirk, of William & Harvey Rowland, Inc., stated that in his belief the cantilever spring would require a heavier frame. W. G. Wall agreed with this but stated that the 6-inch frame allowed for in the list of dimensions would take care of this.

Carburetor Fittings Division

The report on carburetor fittings was chiefly concerned with carburetors which bolt directly against the cylinder casting with a vertical flange. It was read by C. W. Stiger, president of the Stromberg company. Its recommendations, in part follow:

Some time ago certain manufacturers of automobile motors of the block type requested that steps be taken to standardize the method of locating the position of the connecting flange on side-outlet carburetors, in order to avoid the confusion which now exists.

This has been carefully considered by the carburetor fittings division, and after much correspondence between the members and with those most concerned, engine builders and carburetor manufacturers, we recommend the adoption of the present standard flange dimensions and contour, with the bolts placed in a vertical plane, for carburetors of the side-outlet type.

Flared Tube Unions and Union Fittings

It has been found in actual practice that the tolerance now specified for the union nut bore (dimensions M, S. A. E. Data Sheet, 35a, Volume I) is not sufficient for practical screw machine manufacturing and we therefore recommend that it be increased from .002 inch to .005 inch for all sizes.

The revised dimensions for M would be as follows:

M Bore of female part	1/4 inch	5/16 inch	3/8 inch	7/16 inch	1/2 inch
	0.255	0.317	0.380	0.442	0.505
	0.260	0.322	0.385	0.447	0.510

Owing to the demand for S. A. E. Standard Flared Tube Unions and Fittings in sizes larger than those now listed, we recommend the addition of 5-8 inch and 3-4 inch sizes.

W. G. Wall brought up the fact that a great many car manufacturers would like to have the dimension of the cylinder wall to the extreme outside point of the carburetor standardized, as with the streamline type of hood designers are compelled to pinch the hood dimensions to a considerable extent in order to get the sloping effect. C. E. Davis also believed that this dimension should be settled if possible. In response to the natural question as to why the bolts are placed in the horizontal instead of the vertical flange the reason advanced by the committee is that it is easier to arrange the carburetor throttle and the corework on the casting if this is done, even at the sacrifice of accessibility.

Electrical Vehicle Division Report

The report of the electrical vehicle division was read by A. J. Slade, consulting engineer. It is extracted as follows:

Electric vehicle speed ratings shall be based on continuous operation with one-half load over hard, smooth and level roads or pavements at the actual average battery voltage.

A	B	C	D	E	F	G	H	I	SAE STANDARD YOKE J	K	COTTER		d-DRILL		DIFF	DIFF
											d'	L	NO	DIA	d-d'	+K*
$\frac{3}{16}$	$\frac{5}{16}$	$\frac{1}{16}$	$\frac{31}{64}$.4844	$\frac{19}{32}$	$\frac{21}{32}$	$\frac{3}{64}$	$\frac{1}{64}$	.4464	$\frac{7}{16}$.4375	.0089	$\frac{1}{16}$.0625	$\frac{5}{16}$	48	.076	.0135	.0224
$\frac{1}{4}$	$\frac{3}{8}$	$\frac{3}{32}$	$\frac{43}{64}$.6719	$\frac{51}{64}$	$\frac{57}{64}$	$\frac{1}{16}$	$\frac{1}{32}$	.6339	$\frac{5}{8}$.625	.0089	$\frac{1}{16}$.0625	$\frac{7}{16}$	48	.076	.0135	.0224
$\frac{5}{16}$	$\frac{7}{16}$	$\frac{3}{32}$	$\frac{13}{64}$.2031	$\frac{31}{32}$	$\frac{1}{16}$	$\frac{5}{64}$	$\frac{1}{32}$	.7595	$\frac{3}{4}$.750	.0095	$\frac{3}{32}$.0937	$\frac{1}{2}$	36	.106	.0123	.0218
$\frac{3}{8}$	$\frac{1}{2}$	$\frac{1}{8}$	$\frac{15}{64}$.2344	$\frac{3}{32}$	$\frac{7}{32}$	$\frac{5}{64}$	$\frac{1}{32}$	.8845	$\frac{7}{8}$.875	.0095	$\frac{3}{32}$.0937	$\frac{5}{8}$	36	.106	.0123	.0218
$\frac{7}{16}$	$\frac{9}{16}$	$\frac{5}{32}$	$\frac{11}{64}$.1719	$\frac{15}{64}$	$\frac{25}{64}$	$\frac{3}{32}$	$\frac{3}{64}$	1.0095	1 1.000	.0095	$\frac{3}{32}$.0937	$\frac{3}{4}$	36	.106	.0123	.0218
$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{16}$	$\frac{13}{64}$.2031	$\frac{17}{64}$	$\frac{37}{64}$	$\frac{7}{16}$	$\frac{3}{64}$	1.1331	$\frac{11}{16}$ 1.125	.0081	$\frac{1}{8}$.125	$\frac{7}{8}$	28	.140	.015	.0231

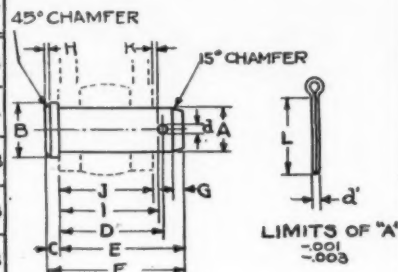
ALL DIMENSIONS IN INCHES

* TOTAL CLEARANCE YOKE TO COTTER

45° CHAMFER

15° CHAMFER

LIMITS OF "A"
.001
-.003



Tabulation of cotter pin dimensions which the miscellaneous division is engaged upon in its standardization work

Electric vehicle mileage ratings shall be based on the rated five-hour discharge capacity of the battery and a continuous run with one-half load over hard, smooth and level roads or pavements or the equivalent.

The division recommends the adoption of two classes of motors for use upon electric vehicles, one series designed for 80 to 85-volt operation, characteristic curves to be furnished by the manufacturers for each of these two voltages. The second series of motors to be designed for 60 to 66-volt operation, characteristic curves for each of these voltages to be furnished by the manufacturer.

It is recommended that each motor shall carry a name plate setting forth the following particulars: Manufacturer's name and address, whether series shunt or compound automobile motor, frame size, volts, amperes, r.p.m.

Under volts, amperes and r.p.m. should be given the figures for both high and low limits of voltage as recommended above.

The division recommends for testing the comparative efficiency of solid rubber tires the use of the rebound test method.

It is recommended that the number of cells in lead acid type batteries be 42 and the number of cells in the nickel iron alkaline type be 60.

The question of the Society making recommendations for the adoption of international standards by the U. S. National Committee of the International Electro-Technical Commission (of which Dr. A. E. Kennelly of the Massachusetts Institute of Technology is secretary) was given consideration by the division, and the suggestion is offered to the Standards Committee that it might be desirable to take some procedure in this direction by offering to this committee for adoption as international standards the recommended practices which our society has accepted covering electric vehicle charging plugs and receptacles and which also have become standard practice of the Electric Vehicle Association of America and the Incorporated Municipal Electric Association of England. It is the opinion of this division that other recommended practices of the society might be advanced for international adoption, and the taking of some action in this particular instance might serve as copy for future action in this direction.

R. McA. Lloyd argued that such standard ratings as are given in the report would not do as a standard of comparison because it would hardly be fair

to judge electric vehicles on a 5-hour discharge rate, for instance, if they were customarily operated at a discharge rate in excess of this. Mr. Slade pointed out in relation to this argument that the rating corresponded to the S. A. E. rating of gasoline cars. It is a standard form of rating, and if the designer can get more than the given rating it is a tribute to his skill and hence a good criterion of the actual performance of the car. Outside of the discussion on this point there was no objection offered to the rating methods by the other members of the standards committee.

Miscellaneous Division Reports

J. C. Utz, Perfection Spring Co., read the report of the Miscellaneous Division. The standard yoke and rod end pins recommended were in accordance with the print reproduced herewith, together with the table of dimensions. In relation to screw threads the report of the division follows:

We recommend the following standard diameters and pitches for thread pitch standard above 1.5-inch diameter. We herewith submit two sizes to be known as fine and coarse thread.

The coarse threads to be as follows: Beginning at 1 5-8 inch and advancing by 1-8-inch increments and extending to 2 7-8 inches, inclusive, 12 threads per inch; beginning with 3 inches and advancing by 1-8-inch increments to 5 7-8 inches, inclusive, 10 threads per inch; beginning with 6 inches and advancing by 1-8-inch increments up, 8 threads per inch.

The fine threads to be as follows: Beginning at 1 5-8 inch and advancing by 1-8 inch increments up, 16 threads per inch.

For flat fan belt widths we recommend the following to be standard practice: 3-4-inch, 1-inch and 1 1-4-inch.

The dimensions for the yoke end pins and the S. A. E. standard screw thread dimensions were accepted without discussion. The dimensions submitted on pulley belts for fans created some discussion on the fact that the widths of the woven belts were apt to vary considerably. It was also thought by some that the pulley itself was a fit subject for standardization. The report was finally amended that the figure given would represent a maximum, and from these the pulley makers could figure their own clearances. The report was adopted with the amendment and will be discussed along with the others at the general meeting.

The report of the Ball and Roller Bearing Division was one of progress.

A table of proposed roller bearings sizes has been drawn up, and these will be submitted to makers who are interested for comment.

The report of the springs division, which will be fully discussed in a later issue after it has come before the meeting of the whole society, brought out one fact that is of importance. This is the chaotic condition of what really constitutes a cantilever spring. In the report of the division it is aimed to adopt a nomenclature of the various types of cantilever. The biggest part of the discussion was on whether or not the quarter elliptic spring is a cantilever or not. According to accepted definitions of cantilever beams there would still be a doubt as to whether or not it can be classed as a cantilever.

The report of the pleasure wheels division was again concerned with the reduction in the number of tire sizes. This was read by E. R. Hall of the Goodyear Company. The sizes have been finally brought to nine: namely, 30 by 3, 30 by 3 1-2, 32 by 4, 32 by 4 1-2, 34 by 4, 34 by 4 1-2, 36 by 4 1-2, 36 by 5 and 38 by 5 1-2. In addition to these there are the oversizes for these tires. No discussion was offered on the adoption of the report, but Henry M. Leland, president of the society, brought up some interesting figures on the variations in the outside diameters of tires, stating that these are so great that they make a difference of between 4 and 8 per cent. on the speedometer readings. Mr. Leland also dwelt on the chaotic conditions which now obtain abroad on the tire situation, stating that the makers of cars who are at present selling in the European market are having the greatest difficulty in meeting the tire requirements simply because every maker has a size of his own. The unstandardized condition of the millimeter-size tire has militated against the expeditious handling of foreign orders by every concern which has sought the export trade.

The standards exchange division is now principally concerned with the bell housing idea, and has gathered together a set of housings that will probably meet the requirements of the majority of the motor manufacturers. In fact, the work of the committee as brought out by Mr. Zimmerschied has been greatly simplified by the fact that most of the makers are using identical dimensions in a large number of instances.

The nomenclature division is closing its work by submitting a standard form in which to include the whole assembly of a car for the purpose of listing the parts for a repair parts catalog.

Quantity Production Favors Metal Body

By H. Jay Hayes
Pres. Hayes Mfg. Co.

AT present, all-metal bodies are being manufactured successfully, the metal being enameled and finished ready to assemble. Up to 1899, nothing but wood entered into the major portion of body construction. Letters patent were granted in 1899 for an all-metal body. This body construction was used on an electric automobile and proved very satisfactory.

There is no question that sheet steel rusts more quickly now than formerly, because of the increased use of carbon and manganese to obtain a smooth surface for finishing.

Metal bodies were more expensive to build in the small quantities used about 1900, and did not appeal to buyers for several reasons, all of which have been eliminated. Later, when gasoline engines came into use, composite bodies with wood frame-work, covered with sheet aluminum or steel, were developed, the aluminum type predominating in high-priced cars. In some cases cast aluminum was used instead of sheet aluminum. In fact, one manufacturer of very high-grade cars still uses cast aluminum panels, which, by the way, are prohibitive for medium-priced cars from the standpoint of cost.

Ills of Wood Bodies

Composite bodies have an advantage not possessed by wood bodies. High-grade lumber necessary for body panels has become scarce. This fact, together with the tendency to check or split on account of extremes of heat and cold, made a very serious situation, especially in large production. Many a manufacturer has spent several days in finishing and varnishing wooden bodies in rooms of high temperature, only to see panels split or check upon being exposed to the cold when loading on freight cars for shipment.

Sheet-metal bodies do not require one-third the paint a wooden body does to obtain the same finish, and the cost of painting is much less. Fewer coats are necessary on metal on account of a filler not being required as on wood. Some body manufacturers are enameling the sheet metal before applying it to the body, baking the enamel at a high tem-

perature, making a very durable and satisfactory finish for medium-priced cars.

Best Steel Used

The steel sheets now being made for the automobile industry are the finest sheets in every way that have ever been manufactured, either in the United States or abroad. The steel employed is selected with the greatest care, after being made from materials specially selected for the purpose. It is essential that the chemical composition and the physical structure be such as to permit of developing the high finish necessary, providing at the same time ductility, strength and durability.

THE CARBON CONTENT SHOULD NOT EXCEED 10 PER CENT. TO PROVIDE DUCTILITY, AND THE MANGANESE CONTENT MUST NOT EXCEED .40 PER CENT. TO PREVENT DETERIORATION.

During the process of manufacture in each department it is necessary to exercise much skill and employ extra care to prevent the development of irregularities which may later on cause the stock to become unsuitable for the purpose intended. The precautions take the form of additional labor and result in materially decreasing the output. The sheets are subjected to a very accurate heat treatment to establish uniform temper and to relieve any internal strain that may have developed during the course of manufacture.

A Body Paradox

THE PERFECT AUTOMOBILE BODY SHEET MUST BE HARD AND SOFT AT THE SAME TIME. IT MUST POSSESS HIGH TENSILE STRENGTH AND GREAT DUCTILITY. ONLY A MIRROR-LIKE SURFACE IS ACCEPTED AND OFTEN-TIMES THAT SURFACE IS SUBJECTED TO MICROSCOPIC INSPECTION. FIVE YEARS AGO A FULL-PICKLED COLD-ROLLED SHEET ANSWERED ALL PURPOSES. TODAY SPECIAL HEATS, ANALYSIS, CAREFULLY SUPERVISED BAR TREATMENT, HOT-ROLLING, COLD-ROLLING AND ANNEALING MUST BE GIVEN TO MEET EACH INDIVIDUAL REQUIREMENT OF A DISCRIMINATING CUSTOMER.

Body, fender and radiator sheets no longer belong to the same family. They may be of the same genus and look alike, but the basic ingredients and qualities are radically different. Steel to be used for pressing or stamping must be soft enough for drawing without cracking or straining the metal too severely.

Usually the stampings for tonneau backs are made in three pieces, as also for the shroud or cowl, and then joined together by spot-welding or acetylene welding and afterwards soldered and smoothed off to make a good joint. Invariably it is necessary to bump or hammer these parts, which naturally hardens the metal, causing crystallization later. While this has apparently been satisfactory, a great deal of care is necessary in preparing the metal for painting. Painters do not like anything that looks like solder. Occasionally trouble arises after the body has been used a short time, on account of opening at the joint, or the paint coming off, attributable possibly to imperfect cleaning of the metal. Some wonderful press operations are now being conducted, eliminating practically all the above difficulties and crystallization, etc. One-piece stampings of back seats and cowls are now being made very satisfactorily in one operation. This allows the metal to remain ductile with but little, if any, tendency to crystallize.

Four-Piece Body

The one-piece stampings make a complete body shell containing practically four pieces, as follows: Tonneau, cowl, two side panels as against eight pieces with the other construction. Again, less wood frame-work is necessary, as the metal has more rigidity and less weight. The metal is also less expensive to finish.

THE GAUGES OF STEEL SHEETS ARE USUALLY 18, 20 AND 22, ACCORDING TO THE STRENGTH REQUIRED. THE METAL MUST HAVE CLEAN SURFACES BEFORE PAINTING. SAND BLASTING IS USED TO ERADICATE ALL IRREGULARITIES. IF METAL IS TO BE EXPOSED TO THE ELEMENTS FOR ANY LENGTH OF TIME, IT IS BETTER TO COAT IT WITH A PRIMER OF RED LEAD, WHICH, BEING A DOUBLE OXIDE OF LEAD, IS AN EXCELLENT ANTI-CORROSIVE PRIMER.

Gradually metal is taking the place of wood in body building, as in railroad car construction. Some of the largest automobile manufacturers are using all-metal bodies. It will be only a short time before the majority of medium-priced cars will be equipped with all-metal bodies finished with enamel, baked on at a high temperature, saving time and producing a much more durable finish.

EDITOR'S NOTE—Paper read before Society of Automobile Engineers at mid-winter meeting, New York, January 6 and 7, 1915.

Makers Should Base Tire Equipment on Car Weight

By Charles B. Whittelsey

Secretary and Factory Manager, Hartford Rubber Works

A PNEUMATIC tire is a cylindrical ring of air surrounded by a covering of canvas and rubber designed to carry a load and to absorb shocks. If the cylindrical ring of air is not of sufficient volume, it cannot do the work for which it is designed. The cylindrical ring of air should be under such a pressure as to permit the tire to carry the load and to absorb the shock. If the pressure of air used in a tire is too great its service will be similar to that of a solid tire, transmitting the shocks in greater volume, thus shortening the life of the car; while a pneumatic tire of proper size and inflation will prolong the life of a car.

The subjects of proper tire sizes and tire inflation are so closely identified that they will have to be discussed together. The variables to be considered in tire pressures are service, economy and comfort. The nature and construction of the tire cover or shoe should be flexible and yielding, so that it may transmit quickly the shock to the cylindrical ring of air.

More Speed, More Heat

The heat generated within the tire has much to do with the air-pressure used—the faster the speed the greater the heat. The greater the heat the greater the strain, on account of the expansion of air within the tire. Continuous driving generates excessive heat, as well as driving in hot weather. Excessive heat is injurious to the shoe and causes rapid deterioration. If there is not sufficient volume of compressed air within the tire, due to using an improper size, to absorb all of the shock and vibration, the surplus shock and vibration is transmitted to the car and, therefore, shortens the life of the car. The greater the volume of air in a tire, the less the increase of heat and strain when driving under climatic conditions which produce excessive heat, as well as when driving at great speed or doing heavy work.

Degree of Inflation

A tire should be sufficiently large not to flatten at the point of road contact more than 14 per cent. of its sectional diameter or on an average 12 per cent., to give good service.

EDITOR'S NOTE—Paper read before mid-winter meeting of Society of Automobile Engineers, New York, January 6 and 7, 1915.

A tire of sufficient volume to properly carry a load with proper tire pressure will, if not properly inflated, deteriorate much more rapidly from excessive flexing, causing the fabric to break down quickly, and is much more liable to puncture. Still the user closes his eyes to these facts, when he considers only the personal comfort of the occupants of the car, for he well knows that an under-inflated tire will give greater riding comfort as it absorbs the vibration and shocks more quickly and thoroughly. After he has driven his tire under-inflated and received a much less than normal mileage from it he is brought face to face with the increase in tire expense which he has brought upon himself.

The personal equation of the driver has to be considered; the tendency not to see that the tires are properly inflated; the manner in which he drives; the service of the car, whether for light or heavy work, the climate and seasons, the geographical location, the type of road-bed, the use of shock absorbers, the spring equipment and the distribution of the load of the car, are also factors.

Oversize Tires

Some automobile manufacturers are inclined to equip their cars arbitrarily with tires not sufficiently large to perform the required service, unless inflated to a pressure making them so rigid as to cause the cars to ride as though equipped with solid tires. This is a short-sighted practice, for the reason that if the user keeps his tires inflated excessively, he shortens the life of his car and increases his car repair bill, and the car maker does not retain the good will of his customer, as he would by putting on tires of sufficient cubical content. This condition caused the tire manufacturers to design what is commonly known as the oversize tire, which was first purchased by the car user after he found out that his car was under-tired, and has since been adopted by many automobile manufacturers.

For example, an automobile manufacturer puts out a car that weighs 2,500 pounds, fully equipped with all the necessary accessories, and designed to carry a given number of passengers, 32 x 31-2 tires; these tires are overloaded. He knows that if the tires do not give service the user will, undoubtedly, buy 33 x 4

tires, which have approximately 25 per cent. greater cubical content than the 32 x 31-2, but cost approximately 40 per cent. more. The manufacturer might have equipped the car with a 32 x 4 tire, which is amply large to carry the load, but this would have added about 35 per cent. to the tire cost of the manufacturer. He would, however, not only have pleased the car owner with the service from his car and the tires, but insured him a greater mileage on the first set of tires and saved him at least 5 per cent. of the tire bill on each renewal.

Oversize Advantages

It has been stated that an oversize tire properly inflated will not last longer than a regular size tire pumped up to its rated inflation pressure. The oversize tires with their larger cubical content will perform a greater amount of work, because there is less heat developed in them. They will pass over stones and receive the shocks of the road with far less liability of fabric breaks, because of the additional amount of cushion in the air to distribute the strain throughout the greater area. They are less liable to puncture because of their additional strength and carrying capacity, which not only increase the life but afford much easier riding.

Pressure Scale

Tire manufacturers have found from years of experience that tires inflated to a pressure of 20 pounds per cross-sectional inch will give the longest life when driven under normal conditions. For example:

2 1/2" tire.....	50 pounds
3" tire.....	60 pounds
3 1/2" tire.....	70 pounds
4" tire.....	80 pounds
4 1/2" tire.....	90 pounds
5" tire.....	100 pounds
5 1/2" tire.....	110 pounds

They are trying to educate the user to see that his tires are kept inflated to this pressure by taking readings with a tire pressure gauge, of which there are several reliable makes on the market at a moderate price. Adjustments are being made on this basis. As in years gone by, many tire users do not have a pressure gauge, but judge the proper inflation by kicking the tire to see whether it is hard enough. In most cases where this crude method is used and a tire gauge is afterwards applied it is found that the tires were from 30 to 50 per cent. under-inflated. There is, however, a great reduction in the number of complaints along this line today.

Permissible Tire Loads

Practically all the tire manufacturers use a nearly uniform table, giving the weight the different sized tires are designed to carry at a stated inflation pressure. If tires were used in accordance with this table, the pros and

cons of tire inflation would be reduced to a minimum.

The following is a list of the loads, cars to be weighed without passengers or luggage, which tires of the different sizes are designed to carry, sufficient allowance being made for the usual number of passengers:

	Rear Weight	Front Weight					
28 x 2½	225 lbs.	275 lbs.	30 x 3½	450 lbs.	550 lbs.	32 x 4½	750 lbs. 950 lbs.
28 x 3	350 lbs.	425 lbs.	31 x 3½	475 lbs.	575 lbs.	34 x 4½	900 lbs. 1125 lbs.
30 x 3	375 lbs.	450 lbs.	32 x 3½	500 lbs.	600 lbs.	35 x 4½	935 lbs. 1175 lbs.
32 x 3	375 lbs.	450 lbs.	33 x 3½	525 lbs.	625 lbs.	36 x 4½	975 lbs. 1225 lbs.
28 x 3½	425 lbs.	500 lbs.	34 x 3½	550 lbs.	650 lbs.	37 x 4½	1010 lbs. 1260 lbs.
			36 x 3½	600 lbs.	700 lbs.	38 x 4½	1050 lbs. 1300 lbs.
			30 x 4	625 lbs.	750 lbs.	42 x 4½	1200 lbs. 1450 lbs.
			31 x 4	635 lbs.	775 lbs.	34 x 5	950 lbs. 1200 lbs.
			32 x 4	650 lbs.	800 lbs.	35 x 5	1000 lbs. 1250 lbs.
			33 x 4	675 lbs.	850 lbs.	36 x 5	1050 lbs. 1300 lbs.
			34 x 4	700 lbs.	875 lbs.	37 x 5	1100 lbs. 1350 lbs.
			35 x 4	735 lbs.	885 lbs.	39 x 5	1200 lbs. 1450 lbs.
			36 x 4	750 lbs.	900 lbs.	43 x 5	1400 lbs. 1550 lbs.
			40 x 4	850 lbs.	1000 lbs.	37 x 5½	1150 lbs. 1400 lbs.
			42 x 4	900 lbs.	1050 lbs.	38 x 5½	1200 lbs. 1450 lbs.

Eleven New Chassis Seen at Show

(Continued from page 17)

front seat to the rear of the chassis. Another change in the car in the way of equipment is the fitting of a power tire pump.

The drive is taken through a disk clutch and a three-speed gearbox. The rear axle is a Hess bevel floating type. Both sets of brakes are on the rear wheels, which are the wood artillery type, with 34 by 4-inch tires.

Considerable improvement in body work and in upholstery is noticeable in the new four. The touring car which lists at \$1,375 is of streamline tendencies. It has a slightly sloping hood and a moulded line at the cowl which eliminates any sharp edges along the length of the body. The roadster sells for \$40 less, listing at \$1,335, and at the purchase price both cars include the electric cranking, lighting and ignition. The standard color is a blue black for both the touring and roadster models.

Jackson Announces New Four

Another Jackson has made its appearance at the show. This is known as model 44, and is really a new edition of what was the Olympic model last year. The power plant is the same as that used in the former Olympic, being a Northway unit having the clutch and gearbox housings integral with the crankcase. The rear construction and the chassis framework are really the same as the former models, but there have been some changes in other details.

This model has a 115-inch wheelbase, 2 inches less than the Jackson of last season. Among the innovations for the company in this model is the use of a generator ignition system worked in conjunction with the Auto-Lite starting and lighting outfit. The underslinging of the rear springs is another feature new to Jackson practice. This gives the car a lower appearance, which distinguishes it at once from the older cars.

The body work of the new car also shows some departures from previous practice. The tendency towards stream lines is new and the use of crowned fenders and double-bulb headlights, with no side lamps, are also Jackson departures.

The motor has L-head cylinders cast in pairs. The dimensions are 4.125 by 4.75 inches. The gearbox furnishes three speeds. The rear axle is a floating Salisbury bevel design geared 3.5 to 1. The tires are 34 by 4 and non skids are standard equipment in the rear. It has a new type of one-man top, which is another feature, making it different from other Jacksons. The car is sold fully equipped for \$1,250.

National Adopts Spiral-Bevel Drive

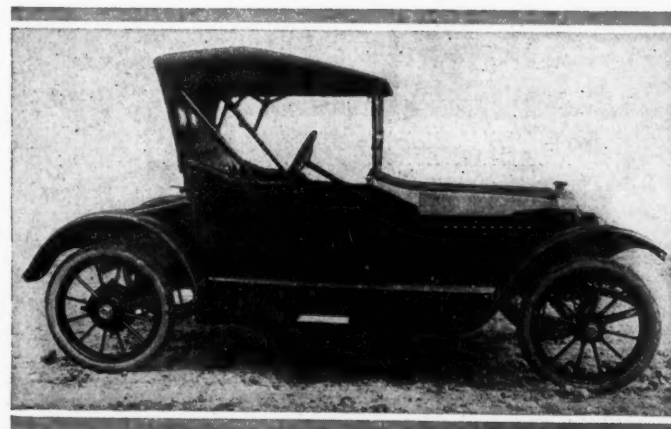
While apparently the National six exhibited at the show is that announced several months ago, it is yet a new model

both in name and for the reason that several improvements have been made. The principal change is in the adoption of the spiral-bevel drive. Other changes which are new for 1915 include a lengthening of the wheelbase from 132 to 134 inches, the mounting of the starting system to the flywheel, instead of using the double deck machine with connection to the timing gears by silent chain, and the addition of Hartford shock absorbers as standard equipment. The five-passenger body has been revamped and now has divided front seats and is longer in the tonneau, due to the 2 inches increase in the wheelbase.

Mechanically the cars are otherwise unchanged, except as is necessitated by the slight alterations enumerated above. The Eisemann magneto is still used for ignition, but the Westinghouse outfit is divided into two units, which are not in any way connected, whereas the double deck construction was formerly used. As compared to the six of a year ago the crankcase is heavier and more rigid, and in the springs silico-manganese replaces carbon steel.

The power plant is a 3.75 by 5.5 L-head block, with water-jacketed intake and with inclosed valve mechanism. The carburetor is a Rayfield and the gasoline feed by pressure.

The feature of the body work exhibit of the National company is the four-passenger parlor car, which has individual seats mounted on tracks, so that they can be placed about the body as desired. If required, they can be lifted from the body individually. In the rear of the body there is a folding seat which holds an additional passenger. In the touring body the car sells for \$2,375. Equipment is complete, including the top, windshield, speedometer, dash instruments and a full set of tools.



The new Malcolm car selling for \$425

Reo Profits in 1914, \$2,539,187

13,516 Automobiles Worth
\$16,332,000 Built—Extra
Dividend—100 Cars a Day

LANSING, MICH., Dec. 31—During the fiscal year ending October 31, 1914, the Reo Motor Car Co., made a net profit of \$2,539,187.34. As a result, it is stated, that some time in January the shareholders will be given one of the now customary Reo melons in the shape of another large extra dividend.

During the present year there were built and shipped 13,516 passenger cars having a total value of \$16,332,000 which brings the total number of cars made by the company since it started in business to a few less than 70,000, having a total value of \$75,000,000.

With the increase of its capital stock from \$2,000,000 to \$3,000,000, arrangements have been made to greatly increase the production facilities of the plant and beginning February 1, a schedule of 100 cars a day will be maintained. This week over 2,300 men were on the pay-roll and this force will probably be increased shortly.

In 1914 the Reo company purchased supplies from manufacturers and merchants located in Lansing and vicinity to the amount of \$1,600,000 which naturally helped the general business and the welfare of the people of the city.

The total amount of wages paid during the year was \$1,654,577, which is one of the largest total pay-roll accounts of the year among automobile manufacturers.

At the last meeting of the stockholders it was decided to change the end of the fiscal year from August 31 to October 31, thus the annual statements for 1914 cover a period of 14 months instead of 12.

The total assets amount to \$5,090,158.87 as compared with \$4,217,474.20 in 1913 and \$3,604,784.05 in 1912. The biggest item is the one for merchandise inventoried at cost and which totals \$1,923,212, or an increase of over \$850,000 over the 1913 account and close to \$1,000,000 more than in 1912. The property account totals \$1,765,989.47, or over \$450,000 more than in 1913. Cash on hand and in the banks is shown to have been \$734,920.21 as against \$885,383.61 in 1913 and \$231,216.10 in 1912. The total of the accounts and bills receivable less reserves is \$656,785.83, or over \$400,000 more than in 1913. Outside investments which totaled \$712,500 in 1913 and \$714,500 in 1912 are set at only \$3,000 for 1914.

The total liabilities consist of \$3,000,000 capital stock or an increase of \$1,000,000 over the 1913 and 1912 statements. The surplus at the end of the fiscal year was \$1,692,082.07, while in 1913 it totaled \$2,061,768.23 and \$1,296,962.59 in 1912. The accounts payable total \$337,578.35 instead of \$126,972 in 1913 and \$280,882.51 in 1912.

In tabulated form for the last 3 years:

ASSETS			
	Oct. 31, 1914	Aug. 31, 1913	Sep. 31, 1912
Cash on hand and in banks..	\$734,920.21	\$885,383.61	\$231,216.10
Accounts and bills receivable less reserves	656,785.83	242,947.53	363,125.86
Merchandise inventory at cost	1,923,212.10	1,064,895.53	980,886.19
Outside investments.....	3,000.00	712,500.00	714,500.00
Property account	1,765,989.47	1,306,856.17	1,313,067.61
Prepaid expenses	6,251.26	4,891.36	1,988.29
Total	\$5,090,158.87	\$4,217,474.20	\$3,604,784.05
LIABILITIES			
	Oct. 31, 1914	Aug. 31, 1913	Sep. 31, 1912
Accounts payable	\$337,578.35	\$126,972.00	\$280,882.51
Accrued pay rolls and salaries	45,293.45	20,136.06	19,768.51
Accrued taxes	15,205.00	8,597.91	7,170.44
Capital stock	3,000,000.00	2,000,000.00	2,000,000.00
Surplus	1,692,082.07	2,061,768.23	1,296,962.59
Total	\$5,090,158.87	\$4,217,474.20	\$3,604,784.05

Dort Co. Incorporates for \$500,000

FLINT, MICH., Dec. 31—The Dort Motor Car Co., which has just been organized to make Dort cars has been incorporated with a capital stock of \$500,000—of which \$400,000 is common and \$100,000 preferred—and of which \$217,000 has been paid in.

The officers are: J. D. Dort, president; D. M. Averill, vice-president and general manager; F. A. Aldrich, secretary-treasurer, and J. D. Mansfield, sales manager. These officers and Geo. L. Simmons constitute the board of directors. Etienne Planche is the chief engineer and designer. At pres-

Automobile Securities Quotations

NEW YORK CITY, Jan. 5—A number of fluctuations marked the transactions in automobile stocks during the first week of the new year. Most of the stocks made slight gains although a few are listed lower than a week ago. General Motors common shows a gain of 4 3-4 points, while the preferred lost 4. Studebaker common gained 4 1-2, while the preferred is 5 points ahead of last week. Maxwell common is 1 1-2 higher and both the preferred lists 2 points higher. Tire stocks except U. S. Rubber and Goodrich were slightly weaker, Ajax-Grieb common losing 10 points though the preferred gained 1, Goodyear common lost 5 and preferred 1. Kelly-Springfield common lost 4; Miller lost 10 points. Stewart-Warner common gained 2.

	1914		1915	
	Bid	Asked	Bid	Asked
Ajax-Grieb Rubber Co. com.....	195	215	250	...
Ajax-Grieb Rubber Co. pfd.....	98	101	100	...
Aluminum Castings pfd.....	97	100	95	100
I. L. Case pfd.....	7	91	77	85
Chalmers Motor Company com.....	90	93	...	88
Chalmers Motor Company pfd.....	90	93	...	82 1/2
Electric Storage Battery Co.....	244	248	350	355
Firestone Tire & Rubber Co. com.....	102	104	110	112
Firestone Tire & Rubber Co. pfd.....	38	38 1/2	81	82
General Motors Company com.....	77	77 1/2	85	90
General Motors Company pfd.....	23	24	23	25
B. F. Goodrich Company com.....	80	81 1/2	92	95
B. F. Goodrich Company pfd.....	240	...	185	188
Goodyear Tire & Rubber Co. com.....	92	94	101	102
Goodyear Tire & Rubber Co. pfd.....	92	100	...	...
Gray & Davis Inc. pfd.....	5	...	...	...
International Motor Co. com.....	15	...	...	...
International Motor Co. pfd.....	38	40	69	70
Kelly-Springfield Tire Co. com.....	106	108	93	79
Kelly-Springfield Tire Co. 1st pfd.....	...	...	93	95
Kelly-Springfield Tire Co. 2nd pfd.....	3	3 1/2	15 1/2	16
Maxwell Motor Company com.....	22 1/2	23 1/4	43 1/2	45
Maxwell Motor Company 1st pfd.....	7	7 1/2	18	19
Maxwell Motor Company 2nd pfd.....	119	125	150	158
Miller Rubber Company.....	125	...	101	...
New Departure Mfg. Co. com.....	100	102	...	120
New Departure Mfg. Co. pfd.....	92	95	90	...
Packard Motor Car Co. com.....	15	25	15	20
Packard Motor Car Co. pfd.....	75	80	...	55
Peerless Motor Car Co. com.....	40	40	25	30
Peerless Motor Car Co. pfd.....	90	90	80	85
Portage Rubber Co. com.....	6 1/2	7 1/4	10 1/2	11 1/4
Portage Rubber Co. pfd.....	14 1/2	15 1/2	22 1/4	...
*Reo Motor Truck Company.....	42	45	...	...
*Reo Motor Car Company.....	49	50	52	53
Splitdorf Electric Co. pfd.....	94	96	99	101
Stewart-Warner Speed. Corp. com.....	19 1/2	20 1/2	35 1/4	35 3/4
Stewart-Warner Speed. Corp. pfd.....	70	71	90	92
Studebaker Corporation com.....	69	71	69	71
Studebaker Corporation pfd.....	...	...	130	134 1/2
Swinehart Tire & Rubber Co.....	58	58 1/2	51 1/2	53
Texas Company.....	102	102 1/2	100 1/2	102 1/2
U. S. Rubber Co. com.....	194	198	199	201
U. S. Rubber Co. pfd.....	105	110	108	110
Vacuum Oil Company.....	105	110	108	110
White Company pfd.....	58	61	83	85
Willys-Overland Co. com.....	83	90	92	94
Willys-Overland Co. pfd.....	...	...	...	...

* Par value \$10; all others \$100 par value. † Ex-dividend.

ent two models, a touring car and a roadster, will be made, production beginning in February.

Consolidated Car Co. Buys Abbott

DETROIT, MICH., Jan. 6—Special Telegram—The Consolidated Car Co. has been organized and has purchased the assets, good will and trade name of the Abbott Motor Car Co. R. A. Palmer, president of the new concern, was during 5 years general manager of the Cartercar Co., of Pontiac. A. C. Knapp, who is vice-president, is also president and general manager of the A. C. Knapp Co., automobile body manufacturers. M. J. Hammers, who is treasurer and general manager, was vice-president and treasurer of the Abbott company. D. E. Perry, purchasing agent and F. E. Sangbush, service manager of the Abbott company, continue in these capacities with the new organization. The transfer of the property is said to have involved properties aggregating nearly \$500,000. E. F. Gerber, principal stockholder in the Abbott company, who became interested in that concern about a year ago is not identified with the Consolidated concern. It is stated that the Consolidated Car Co. will handle the service business on Abbott-Detroit cars and that the original corps of dealers throughout the country is maintained.

Hood Rubber Common Increased \$1,000,000

BOSTON, MASS., Jan. 5—The stockholders of the Hood Rubber Co. have voted to increase the common stock from \$1,000,000 to \$2,000,000 out of surplus. The directors later voted to issue \$150,000 of additional preferred stock. This makes the total amount of preferred stock outstanding, \$2,300,000.

Market Reports for the Week

NEW YORK CITY, Jan. 6—The dropping of fine Up-River Para rubber from \$0.75 to \$0.72 was the only important change in this week's market reports. A weaker tone developed for crude rubber and prices declined all around. The depression was due mainly to a growing belief among some in the trade that the embargo on shipments of plantation rubber from England is likely to be lifted in the near future or at least modified to the extent that rubber previously purchased and now owned by American interests can be brought to this country. Reports current that the English Government is endeavoring to divert to Liverpool shipments of rubber from Brazil destined to New York City, had no effect upon the market. Petroleum from the Pennsylvania wells, went up \$0.05 per barrel. Recent reports from Washington state that the output for petroleum in 1914 was the largest in the history of the industry, being estimated at 292,000,000 barrels. It is also estimated that nearly 70 per cent. of this output came from California and Oklahoma. The petroleum change was the only one for the oil and lubricants market. Cottonseed oil rose \$0.23 a barrel and was generally steady with a better consuming demand. A better demand for electrolytic copper was shown this week from domestic consumers.

Material.	Wed.	Thurs.	Sat.	Mon.	Tues.	Week's Change
Antimony	.13½	.13½	.13½	.13½	.13½	.....
Beams & Channels, 100 lbs.	1.21	1.21	1.21	1.21	1.21	.....
Bessemer Steel, ton	18.50	18.50	18.50	18.50	18.50	.....
Copper, Elec., lb.	.12¾	.12¾	.12¾	.12¾	.12¾	+00¼
Copper, Lake, lb.	.13½	.13½	.13	.13	.13½	.....
Cottonseed Oil, bbl.	5.81	5.85	5.85	5.90	6.04	+23
Cyanide Potash, lb.	.21	.21	.21	.21	.21	.....
Fish Oil, Menhaden, Brown.	.38	.38	.38	.38	.38	.....
Gasoline, Auto, bbl.	.13	.13	.13	.13	.13	.....
Lard Oil, prime	.90	.90	.90	.90	.90	.....
Lead, 100 lbs.	3.80	3.80	3.80	3.80	3.75	.....
Linseed Oil	.50	.50	.50	.50	.50	.....
Open-Hearth Steel, ton	18.50	18.50	18.50	18.50	18.50	.....
Petroleum, bbl., Kans., crude	.55	.55	.55	.55	.55	.....
Petroleum, bbl., Pa., crude	1.45	1.45	1.45	1.50	1.50	+05
Rapeseed Oil, refined	.71	.71	.71	.71	.71	.....
Rubber, Fine Up-River, Para	.75	.75	.75	.75	.72	-03
Silk, raw, Ital.	3.90	..	..	3.90	3.90	.....
Silk, raw, Japan	3.33	..	..	3.33	3.35	+02
Sulphuric Acid, 60 Baume	.90	.90	.90	.90	.90	.....
Tin, 100 lb.	32.88	32.75	32.75	33.13	33.00	+12
Tire Scrap	.05	.05	.05	.05	.05	.....

Pratt & Whitney Buy Pope Main Works

HARTFORD, CONN., Jan. 2—Judge E. B. Gager of the superior court of Hartford county has authorized Colonel George Pope, receiver of the Pope Manufacturing Co. to accept the offer of Pratt & Whitney of \$300,000 for the main works of the Pope company on Capitol avenue. A hearing on the petition of the receiver was held Thursday of this week. The purchaser, a subsidiary of the Niles-Bement-Pond combination, agrees to pay the broker's commission of \$6,000. A pro rata amount of the municipal taxes will likewise be assumed by the buyers. At the present time the Hartford Motor Car Co. is a tenant in the new section, having purchased the Pope-Hartford parts business some time ago. For the time being this concern will continue to occupy the premises. Recently the Smith Worthington Co. rented a portion of the plant, the lease running until May 1. The purchase includes a tract of land 565 feet front on Capitol avenue and 450 feet rear along the bank of the Park river. The Pratt & Whitney property bounds the Pope factories on three sides. As soon as the necessary papers are executed, it is said that the purchasers will immediately move into the new \$165,000 addition, which means that employment will be provided for many men now out of work.

Fisk Reduces Prices on Tires

NEW YORK CITY, Jan. 5—The Fisk Rubber Co., this city, has revised its price list showing a drop in several of the popular sizes. The prices on the plain tread casings remain about the same. The prices on white non-skid casings and gray tubes are reduced. The discounts and terms on this list are the same as on previous lists. The following list gives the changes, if any, in several of the popular sizes:

Size	Former Price	New Price
30 x 3	\$12.30	No change
34 x 4	26.35	\$25.65
35 x 4	27.20	26.45
36 x 4½	37.10	36.85
35 x 5	42.40	41.65

The gray tube 30 x 3½, was formerly \$4 and is now \$3.70. The red tube has no change, while the Red Top tire and tube are about the same as those on white non-skid and gray tubes heretofore.

Rubber Makers in Quandary

Embargo May Force Them To Close Their Plants or Buy at Exorbitant Rates

NEW YORK CITY, Jan. 5—The crude rubber situation has not been relieved from the embargo tension during the past week and as things now stand Brazil is the only country with a large available supply of rubber, and it is being sold at inflated prices. American tire makers will soon be compelled to decide whether to buy Brazilian rubber or close their factories. A number of them are holding back and waiting in the event that the British embargo, preventing export of crude rubber from England, will be lifted; others are going ahead and buying Brazilian rubber at the present high rates. Here is where the big question in the minds of the manufacturers arises: is the manufacturer who is taking in Brazilian rubber supplies at high prices going to be at a disadvantage over those who wait; that is, if the embargo is lifted? It is a fact that the Brazilian prices will fall 50 per cent. if the embargo is removed, and in that event the tire manufacturer with a large supply of high-priced rubber will be nipped. At present, however, the majority of the tire manufacturers are buying very little of the Brazilian supply and are still buying their usual quantities of British rubber, which is selling at about \$.50 a pound, and are storing it in Singapore, Colombo, England and Canada for prompt shipment to New York City when trade is resumed. This is all based on the hope for a speedy adjustment of the embargo.

A number of suggestions have been made by American rubber dealers who have suggested the following:

1. The removal of the embargo under proper guarantees, thus immediately restoring the manufacturing industry of this country and the crude rubber industry of Great Britain to a normal and healthy basis.

2. Agreement by the British government that it will not remove the embargo for at least 6 months. This plan, it is stated, would at least give stability to the situation. American manufacturers could buy Brazilian rubber knowing that our market would not shortly be flooded with British rubber.

3. Immediate action by the American Congress prohibiting absolutely the importation of British rubber or products thereof or any kind of manufactured rubber goods into the United States. This plan has not been officially presented at Washington, but unofficially discussed.

If favorable diplomatic or commercial action cannot be obtained by January 10, it is said, the matter will be presented to Congress in the form of a resolution.

In an effort to lift the embargo, B. G. Work, president of the B. F. Goodrich Co., Akron, O., and representative of the Rubber Club of America, sailed on the Lusitania to confer with representatives of the British government.

Rubber Imports 4,876,900 Pounds

NEW YORK CITY, Jan. 1—Imports of rubber from Para to this port, from November 28 to December 22, amounted to 4,876,900 pounds. On November 28, 1,298,800 pounds came in. On December 10, 348,100 pounds came in from Para. On December 16, Manaos brought in 2,890,000 pounds, the largest shipment that month. Another shipment from Para amounted to 285,300 arriving on December 22. Entries for November amounted to 5,920,000 pounds. 1,220,000 pounds were held for later shipment.

The exports of Ceylon grown rubber from January 1 to November 16, 1914, amounted to 30,339,695 pounds as compared with 21,990,065 in 1913. Great Britain was the biggest buyer with 15,940,685 pounds and the United States was next with 9,108,791.

The total exports from Malaya from November 4, 1913 to November 7, 1914, amounted to 81,866,044. Great Britain again led with 61,961,710 pounds with the United States again second with 11,857,069.

Rubber exports from the Straits Settlements, East Indies, from January, 1914 to October amounted to 30,046,000 pounds. The October exports amounted to 4,012,000 pounds as compared with 2,288,000 pounds in 1913.

Arrivals of Guayule rubber from Mexico for the 9 months ending September were 1,075,676 pounds, valued at \$440,262. against 4,675,798 pounds, valued at \$2,043,813, last year.

Car and Truck Exports During 1914 Total Nearly \$28,000,000

WASHINGTON, D. C., Jan. 2—The rapid growth of the exports of automobiles and trucks from the United States, which amounted to nearly \$28,000,000 during the fiscal year 1914, exclusive of parts and accessories, reflects the extraordinary development of the American motor car industry, according to a statement issued by bureau of foreign and domestic commerce. While the sum mentioned is not very impressive as compared with the value of the motor cars produced in the United States during the last year, it is nearly forty-five times as large as the value of the motor cars imported into the country in the same year, and thirteen times as large as the exports of automobiles a decade ago.

According to the bureau's statement, the success of the American automobile industry, particularly as regards low and medium-priced cars, is generally attributed to the American methods of standardization, which make possible the extensive use of machinery but which also require production on a large scale. Under such conditions an outlet to foreign markets becomes a necessary adjunct to economical production for the domestic demand and the American manufacturers of motor cars have therefore manifested a keen interest in the conditions affecting the marketing of their products in foreign countries.

One of the first things generally considered in this connection

is the import duties imposed on motor cars in foreign countries. In considering the foreign tariffs on automobiles and trucks in connection with the distribution of the American cars exported during the fiscal year 1914, it would seem that the rate of duty is not always the determining factor. Our best two customers for cars are the United Kingdom, which admits them free of duty, and Canada, where they are dutiable at 35 per cent. ad valorem, each taking about one-fifth of our total exports. Australia, in spite of its import duty of about \$120 on the body, 5 per cent. on the chassis, and 25 per cent. on the tires, bought American motor cars to the value of more than \$2,600,000, while Argentina, with its comparatively low rate of 12 per cent. ad valorem, took only about \$1,000,000 worth, or about four times as much as was taken by Brazil, where the duty is about 16 per cent.

An interesting feature in connection with the importation of cars into Australia and New Zealand is the requirement for a detailed list of the prices of the various component parts and accessories as sold for home consumption, such prices being used as a basis for ad valorem duties. This requirement differs from the provision of the Canadian dumping clause, where the statement in regard to the value for home consumption is required for the purpose of preventing or penalizing unfair competition with Canadian producers.

Court Decisions Affecting the Industry

J-M Shock Absorber Does Not Infringe

CHICAGO, ILL., Jan. 5—The court of appeals, sitting in Chicago, reversed the decision of the lower court handed down last May in the suit of the Blackledge Mfg. Co., Chicago, against the J-M Shock Absorber Co. and held that the J-M shock absorber does not infringe the Velvet shock absorber made by the former concern.

Judge Sandburn in the United States district court handed down a decision on May 8, 1914, stating that the J-M shock absorber does infringe the Velvet, which is manufactured under Patent No. 988,229 issued to Charles A. Tilt, March 28, 1911. This patent relates to a shock absorber of the coil spring type which prevents excessive shock being transmitted to the car and passengers and also eliminates side sway.

The Blackledge company claimed in its suit in the lower court that the J-M shock absorber is made under Patent No. 1,015,682 issued to L. P. Jaquet, January 23, 1912. Both this and the Tilt patent are similar. The latter consists essentially of two coil springs operating in cylindrical cylinders and having a guide in the form of a rod inside each spring with metal sleeves which may slide up and down over the rods within the range of spring vibration. The decision of the court of appeals brings to an end this suit, which originally was filed April 13, 1913, against Albert J. Dueth and Alexander J. Dueth, doing business as the Alfredal Co. in Chicago, and handling J-M shock absorbers.

Motz Wins Cushion Tire Suit

NEW YORK CITY, Jan. 5—The Motz Tire & Rubber Co. has won out in a suit brought against it for alleged infringement on a cushion tire with undercut sides. Messrs. E. B. Cadwell, F. P. Johnston and F. M. Ashley, each holding a one-third interest in Patent No. 887,997, issued May 19, 1908, were the plaintiffs. Mr. Cadwell was the inventor. The prayer for injunction was denied by the court. Albert T. Scharps, attorney for the Cadwell interests, states that an appeal will be made.

Judge Sheppard in his memorandum opinion states that the resiliency of the tire under pressure is the object to be attained in the suit and that the opinion of the court is that the arrangement and shape of the tread, lobes, grooves and buttresses in the Motz tire are not anticipated in the Cadwell patent.

He goes on to say, "The tire manufactured by the Motz company is slightly different in construction to that described in its patent but is substantially the same and its features are so arranged that

new results are obtained; that is to say, the buttresses in the grooves lie one upon the other when the tire is under strain or load pressure which produces tire cushioning at all points. This cushioning effect seems to be greatly improved and the resiliency increased by use of a double lobe tread with a broken valley between.

"From ocular experiments made in court it does not appear that the Cadwell tire patent issued May 19, 1908, ever with substantial changes in construction would be capable of anything like the same utility.

"The Swinehart patents, Nos. 826,622, issued July 24, 1906, and 902,926, issued November 3, 1908, do not anticipate the Motz invention, No. 925,937, for it is seen in those patents use was made only of a continuous tread and a slight groove inside of the tire."

The suit was filed September 7, 1913, in the United States district court, Southern district of New York.

Reports from Receiverships

CARTHAGE, O., Jan. 4—In his first and final report as receiver for the bankrupt Crescent Motor Company, Carthage, O., Louis J. Huwe, Deputy United States Marshal, declared that the affairs of the company had been remarkably well administered. From September 28, the time of his appointment as receiver, up to the time of his appointment as trustee in bankruptcy of the concern, Huwe made sales and collections amounting to \$17,944.51. He spent \$8,650.56, leaving a balance of \$9,337.51. Huwe reported that he turned over to himself as trustee this balance, together with other assets of the company valued at \$101,171.55.

PORT HURON, MICH., Dec. 31—Bids for the real estate, building and power house of the bankrupt Havers Motor Car Co., were so low that none was accepted by trustee Frank A. Wilson, who, however, accepted the offer of \$7,500 made by the Harris Brothers Co., Detroit, for the stock, material and other accessories, in other words, the equipment.

KALAMAZOO, MICH., Dec. 30—At yesterday's hearing of Victor L. Palmer, formerly secretary and treasurer of the bankrupt Michigan Buggy Co., referee in bankruptcy W. J. Banyon learned that Palmer has liabilities totaling \$1,500,000 while his total assets are scheduled as being worth \$1,425. The creditors will receive, according to the referee, one twelfth of one per cent.

It also developed that claims aggregating \$1,520,172.40 have been filed against former president Frank B. Lay, Sr., of the bankrupt company. His assets are scheduled at \$87,-

164.08. Most of the claims are in the shape of notes which had been signed by Lay in his capacity as official of the company.

Fiat-Isotta Suit Is Settled

NEW YORK CITY, Jan. 6.—The two suits brought by the Fiat Automobile Co., Poughkeepsie, N. Y., against the Isotta-Fraschini Motors Co., Milan, Italy, for alleged infringements on its yoke construction on the front end of the tube enclosing the propeller shaft and certain improvements in vehicle frame suspension, have been dismissed, without costs to either party. Both suits were filed in 1913 and involved Patent No. 1,050,049 covering the yoke construction and 979,278, issued January 7, 1913, covering certain improvements in vehicle frame suspension. The inventor of the first patent was Giovannina Agnelli, president of the Fabbrica Italiana Automobili Torino. Guido Fornaca was the inventor of the second patent, issued December 20, 1910.

Walpole Tire Sale Set for March 10

BOSTON, MASS., Jan. 4.—The Walpole Tire & Rubber Co. will be sold March 10. An attempt was made to fix an upset price at \$850,000, but this was defeated. The sale will be made without restrictions, except that no bid will be received unless accompanied by a certified check for \$50,000. The sale will be held at Walpole at 11.30 a. m., and the property will be sold as a whole and as a going concern to the highest bidder.

To Sell Lozier Plant Feb. 4

DETROIT, MICH., Jan. 5.—The Detroit Trust Co., trustee, will sell the plant of the Lozier Motor Co., Thursday morning, February 4 in the United States district court.

At the meeting of the creditors of the bankrupt company, held

last week, it was suggested by Vice-President Joseph A. Bower of the Detroit Trust Co., trustee, that, as there is on hand in the plant \$200,000 worth of material by purchasing \$300,000 worth of additional new material, it will be possible to build 300 Lozier sixes and 300 Lozier fours, the latter to be sold at \$1,000 and the former at \$2,000, which would result in obtaining \$900,000.

This suggestion was not adopted by the creditors, who, however, voted favorably upon the proposition of attorney Leo M. Butzel that when bona fide offers for cars are received they should be built.

Lansdale in Charge of Krit Companies

DETROIT, MICH., Jan. 2.—Henry Lansdale, general manager of the Krit Motor Car Co., has been appointed custodian of that concern and of the Krit Sales Co., both of which filed a petition of bankruptcy last week. At the first meeting of creditors which has been called by referee in bankruptcy Lee E. Joslyn, and which will be held January 18, a trustee will be appointed.

The reason given for the present difficulties of the Krit Motor Car Co., was its inability to secure financial assistance during the last few months.

A dealer speaking about the matter said: "In my territory the demand for the Krit has been greater during the last 2 months than at any time during the whole year. However, people desiring to buy did not want to pay except on long terms. Everybody wants credit, wants six months or more to pay for his car, and, in most cases at the end of the sixth month the money is not forthcoming. It is not a case of the people not having the money, but they prefer to leave it in the bank, as they are still too uncertain as to the future. The effects of the war are by no means as much minimized or improved as people are saying."

Until the meeting of creditors January 18 only the service department of the car company is in operation, all other departments having been closed. However, dealers can buy cars from the company.

Massachusetts Court Holds Tire Core Patent Invalid

BOSTON, MASS., Dec. 31.—The tire core patent No. 865,064, covering a collapsible core or mangrel the object of which is to be used in the building up of a tire, after which it may be easily removed, has been declared invalid.

The patent which was granted September 3, 1907 to W. C. State, was taken over by the Goodyear Tire & Rubber Co., Akron, O., which brought suit against the Hood Rubber Co., Watertown Mass., claiming infringement.

The Goodyear company claimed in its suit that the State patent covered all types of cores, used in the manufacture of detachable tires, having substantially non-extensible edges and comprising a plurality of independent sections held in ring formation by one or more rings overlapping the inner portions of the sections.

The decision, which was rendered by Judge Dodge in the U. S. district court for the district of Massachusetts, stated that prior to the invention of this core by State, substantially the same construction had been in commercial use at several other tire making plants, in the manufacture of detachable tires, having substantially non-extensible edges.

This core is made of four independent segments with inwardly projecting portions constituting an annular beading, with a pair of rings adapted for clamping these members in a proper relation to each other. In constructing the outer tubes or wear-resisting casings of pneumatic tires, this core or mandrel, which is annular, is employed on which the tire is built up of rubber and fabric. During this operation the edges on the side bands of the tire, engaged by retaining means of a wheel rim, are so formed as to render them as inextensible as possible. After the tire has been built up and has been vulcanized, the segments of the core may be easily removed.

The suit just decided was filed December 5, 1910. Another suit on the same patent brought by the Goodyear Tire & Rubber Co. against the Ajax-Grieb Co. is now pending in the United States District Court for the District of New Jersey.

On October 27, 1914, the de Laski & Thropp Circular Woven Tire Co., Trenton, N. J., was awarded the decision in the U. S. district court there in its suit against the W. R. Thropp & Sons Co., Trenton, on a tire wrapping machine put out by this company, under patent No. 1,011,450, dated December 12, 1911.

OWEGO, N. Y., Jan. 4.—The Owego Car Co., Inc., manufacturer of the Owego cyclecar, with a plant in Owego and offices in New York City, at 286 Fifth avenue, has filed a petition in bankruptcy in the latter city with liabilities of \$43,642 and assets of \$25,078.

Universal Rim Co. Claims Infringement of Three Patents

CLEVELAND, O., Dec. 30.—Suit has been filed in the U. S. district court here by the Universal Rim Co., Chicago, against the Standard Welding Co. of this city. The former claiming specific infringement of its three patents Nos. 1,095,770, 1,095,775, 1,095,953. These three patents relate to demountable rims and are claimed by the Universal company to be infringed by rims Nos. 20 and 21, made by the Standard Welding Co.

The patent No. 1,095,770 was issued to Joseph A. Anglada, May 5, 1914, and transferred to the Universal Rim Co., which claims particularly infringement of claims 3 and 4, which read:

"A transversely-split, integrally flanged tire-carrying demountable rim having a hole 15 in one end, in combination with a rigid latch 13 fixed on the other end of the rim, extending beneath the end containing said hole and having a lug to snap into said hole, to connect said ends.

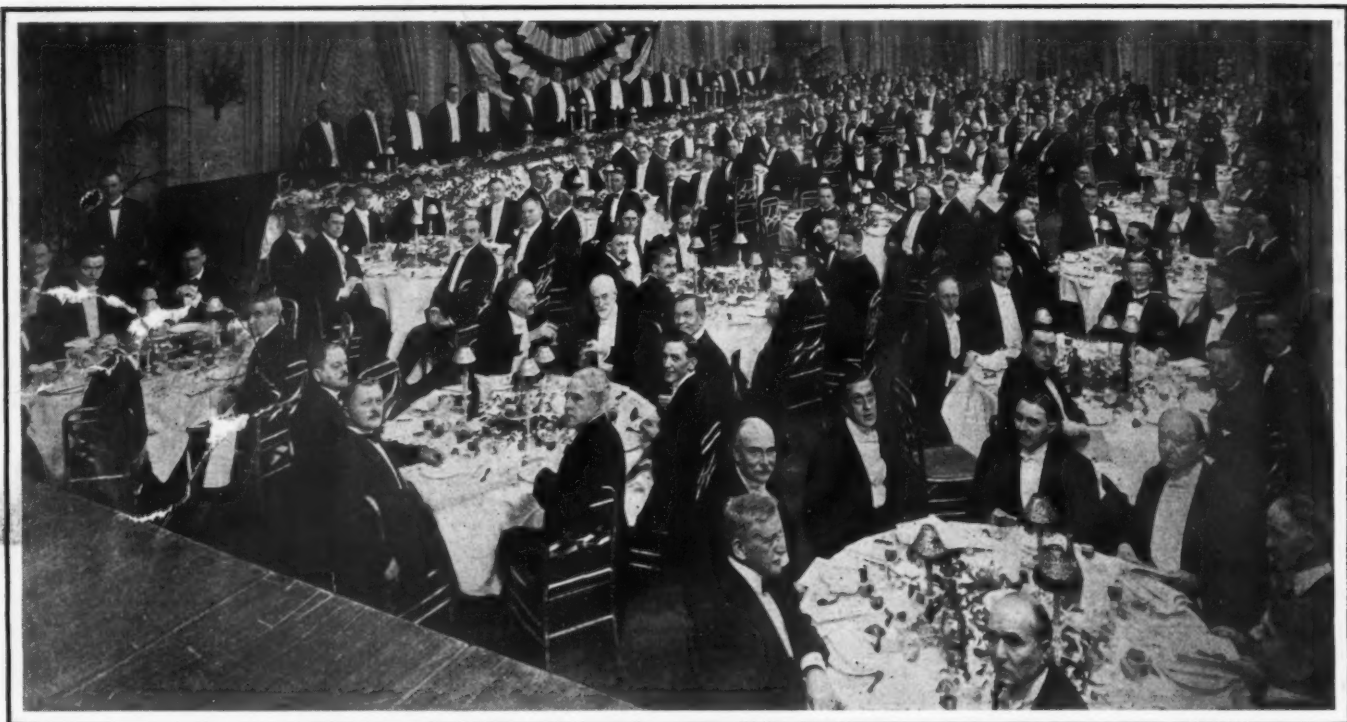
"An integrally flanged tire carrying demountable rim transversely split upon a plane inclined to a radius of the rim and having a hole 15 in one end, in combination with a rigid latch member 13 on the other end of the rim, extending beneath the end 10 containing said hole and having a lug 14 to snap into said hole, to separably connect said ends of the rim."

Patent No. 1,095,775 was issued to Erle K. Baker, and assigned to the Universal Rim Co., the patent date being May 5, 1914. In this patent the Universal company claims infringement particularly of claims 1 and 9, which read:

"A one-piece integrally flanged demountable rim of the bolted-on class described and transversely split at one point only in its circumference, in combination with a plate extending across said split and positively and non-adjustably but detachably connecting the ends of the rim, for the purposes specified.

"A one-piece integrally flanged demountable rim of the bolted-on class described transversely split at one point only in its circumference and presenting straight cut non-interlocking opposed rim ends, and means on said ends positively but detachably connecting the same to render the rim inexpandable by the bolting-on devices, for the purposes specified."

Both of the patents above mentioned were filed in 1910, together with something like forty others, and in the following year, in February, the third patent upon which this suit is brought was filed. This, No. 1,095,953, also issued to Baker, and patented on May 5, 1914, relates to a rim of such construction that the rim shall be automatically centered upon the wheel when placed upon it. It relates to improvements in which the demountability is secured



View of the National Automobile Chamber of Commerce Banquet held at the Waldorf-Astoria Hotel. Attendance 480

Maryland Law Is Held Valid

WASHINGTON, D. C., Jan. 5.—*Special Telegram*—The constitutionality of Maryland's automobile law, imposing a tax on Washington motorists traveling in that state was upheld today by the supreme court of the United States in an opinion rendered by Justice McReynolds, which was concurred in by the entire court. The case was that of Hendrick vs. Maryland. Justice McReynolds, in the decision of the court, affirming the decree of lower court, said:

The suit was brought in July, 1910, by J. Tilghmann Hendrick, a Washington, D. C., motorist who was required to carry a Maryland license before he was allowed to drive his car in the state. He decided to make a test case of the matter and it was argued before the supreme court in November of this year. The decision of Justice McReynolds establishes the right of a state to require an automobilist living in another state to take out a license before traveling over its roads.

Good-Fellowship at N. A. C. C. Banquet

NEW YORK CITY, Jan. 6—Colonel Charles Clifton, as toast-master, struck the dominant note of the National Automobile Chamber of Commerce, Inc., banquet held at the Waldorf-Astoria last night, when he spoke of the friendship among the members of the automobile industry. This is the first annual banquet of the Chamber which represents the outgrowth of the Association of Licensed Automobile Manufacturers, the National Association of Automobile Manufacturers and the Automobile Board of Trade.

There were 480 in attendance representing the leaders in the car industry and the feeling of good fellowship exhibited throughout the evening bore out Colonel Clifton's remark that the automobile field is different from any other in that everyone seems to know one another and hence the petty rivalries engendered by business competition vanish under the influence of the friendship which permeates the industry.

There was but one speaker, Irvin S. Cobb, who told of his experiences in the zone of war. His remark that the speed of the automobile in bringing wounded quickly to a place where they could be attended to, had probably saved many a life, was greeted with applause.

Besides the speaker the entertainment was largely made up of cartoons of men prominent in the industry and bearing suitable inscriptions which evoked continual roars of merriment. These were thrown on a screen.

The affair represented the greatest gathering ever held of men influential in the automobile industry. The spirit of good-fellowship which prevailed was typified when H. B. Joy, leader of the Kardo patent group and Alfred Reeves of the Chamber of Commerce waltzed together down the center aisle of the banquet hall to an improvised parody entitled "It's a Long Way to Judication," the reference being to the present legal war between the N. A. C. C. and the Kardo group.

Remy to Move Plant to Detroit

DETROIT, MICH., Jan. 6.—*Special Telegram*—The first step in the removal to this city of the entire plant of the Remy Electric Co., now located at Anderson, Ind., has been taken in the purchase of a desirable factory property. It is the intention to begin building operations at once with the idea of eventually locating the entire plant here. The negotiations for the bringing of the Remy organization here have been under way for about 2 months, the Detroit Board of Commerce being largely responsible for it.

When completed, the plant now contemplated will employ about 200 men. The Remy factory at Anderson is said to employ about 1,500 men.

Klaxon Removes Competitor's Horn from Show

NEW YORK CITY, Jan. 6—Charging that a large motor-operated horn exhibited at the New York Automobile show by the Heinze Electric Co. constitutes unfair competition in that it is an imitation in appearance of the right angle design of the type-L Klaxon, the Lovell-McConnell Mfg. Co. caused the horn to be temporarily removed from the show yesterday. The removal was upon a restraining order of the Federal court which will hold a hearing on the matter Friday.

Burman Breaks A. A. A. 5 to 50 Mile Records for 1-Mile Dirt Tracks

BAKERSFIELD, CAL., Jan. 3.—*Special Telegram*—Barney Oldfield again met defeat at the hands of Bob Burman today, the American speed kind duplicating the victory scored at Los Angeles last Sunday in the second of a series of 50-mile races held on the local 1-mile dirt track and incidentally establishing new A. A. A. records from 5 miles to 50 miles, inclusive.

Burman traveled the half-century in 40 minutes 58 seconds. The best time previously for this distance was 47 minutes 21 seconds, made by Louis Disbrow at San José. Burman lowered the 25-mile record from 22 minutes 26 seconds to 20 minutes 28 4-5 seconds and cut the 5-mile mark from 4 minutes 6 1-2 seconds to 4 minutes 2 seconds.

Chicago Tests Truck Fenders

Dummy Trials Fail to Show Value of Equipment Required for Vehicles by City Ordinance

CHICAGO, ILL., Dec. 30.—The City of Chicago today conducted a series of tests on a new safety vehicle fender to determine whether this type conformed to the specifications set down by the fender committee. More than 100 dealers from motor row, most of them members of the Chicago Automobile Trade Assn., witnessed the tests.

The test is the initial one of a series, the outcome of the recent publication of a city ordinance as follows:

Section 2550 1-2. It shall be unlawful for any person, firm or corporation to use and operate within the City of Chicago any motor car or truck for the purpose of conveying therein bundles, parcels, baggage or wares, merchandise or other similar articles, unless said motor car or motor truck is provided with a fender as in the case of street cars operated and used within said city, or such design as shall meet the requirements for uniform tests to be made under the direction of the clerical, mechanical and inspection bureau of the Department of Police and shall be approved as efficient by the General Superintendent of Police.

Section 2. Upon being duly approved and published, this ordinance take effect and be in force from and after March 1, 1915.

In the tests conducted three leather dummies were used and each dummy was put through a number of different tests. Those in charge have outlined a series of something like 120 different tests for each fender, using three different dummies, one representing a child, another a youth and a third a full-grown man. Each dummy is placed in a number of different positions, there being something like thirteen of these and the vehicle strikes the dummy at various speeds ranging from 3 to 15 miles per hour.

In today's tests the dummy was invariably carried along the ground in front of the fender in all the tests above 7 miles per hour. At 3 miles per hour the dummy was struck and thrown in front of the fender but the driver, knowing the dummy was about to be hit, stopped the car before it again reached the false man. In other words, if a real man were struck at 7 miles per hour or more he would be thrown down by the fender, and then scraped along the ground until the car was stopped. In the tests the driver knows he is going to strike the object and he can stop within a short distance. In one test the dummy is made to face the vehicle. This seems an unfair test since a man facing a vehicle naturally will see it and hence move out of the way. With the dummy facing, its feet are caught under the fender.

Raise Car License Fees in Ontario

WINDSOR, ONT., Jan. 2.—An increase in the automobile license taxes which have gone into effect in Ontario with the first day of 1915, will, it is estimated, result in increasing the revenue of the province of Ontario by \$100,000 annually. The rates are now as follows: for gasoline cars up to 25 horsepower, \$6; from 25.1 horsepower to 35 horsepower, \$10; from 35.1 horsepower to 50 horsepower, \$20; over 50 horsepower, \$25; electric vehicles, \$5. Dealers and manufacturers fee is \$25, for which they will be supplied with five plates or markers.

Canadian Armored Battery Nearly Complete

OTTAWA, ONT., Dec. 31.—Borden's Armored Battery is the name that has been given to the battery of armored cars which has been presented to the government by a number of prominent Montreal gentlemen, and which is under the command of Major Holland, V. C., of Ottawa. The battery is at present housed in Montreal awaiting the completion of its equipment. The type of car which is being used by this battery is unique and the novel lines on which it is being constructed are the invention of the commander of the battery, Major Holland. The car carries a turret in which the quick firing gun is mounted. This turret can be swung in a complete circle so that the fire of the gun can be brought to bear on any point of the compass desired. The swinging of the turret is effected by the gunner, who to turn himself, his turret and his gun does not have to take his hand from the breech of his weapon, the movement being entirely effected

by his feet. There are many other novel and valuable features to the cars, among them being a triangular shaped loop-hole at the front and rear for rifle fire, and it enables the marksman in the car to direct his fire to either side as well as to directly in front of him, the direction to which he is limited in the case of cars fitted with circular loop-holes. Several of the ideas for this car were gathered by Major Holland during his work with armored cars in South African War, and the improvements he has made are the outcome of his experience there.

1200 London Buses Commandeered

NEW YORK CITY, Jan. 2.—Twelve hundred motor buses formerly used on the streets of London have been commandeered by the British government for war purposes, according to W. E. Mandelick, secretary of the London General Omnibus Co., who has just arrived in this country. This number is practically one-third of the fleet of 3,500 buses owned by the General Omnibus Co. The chauffeurs also have been commandeered and are now employees of the government.

The buses are used as ambulances and for the transportation of troops and supplies of food and ammunition. According to reports from the scene of fighting on the Continent, which have been given out through the war department in London, the buses have made excellent showing. The general staff has many times commended the drivers for excellent service.

The government has also commandeered the entire output of the factory as fast as the buses can be built and equipped.

Since the outbreak of the war the earnings of the General Omnibus company have been normal, notwithstanding the large number of buses taken off the streets for war purposes. There is not as much traffic as heretofore, but as so many of the buses are out of commission the service is equal to the demand.

RIVERSIDE, CAL., Dec. 31.—An unofficial road record was established by the Maxwell this morning when Billy Carlson, member of the Maxwell racing team, piloted the little Phoenix road racer Maxwell 25 from Los Angeles to Riverside, 58 miles, in 56 minutes, 25 4-5 seconds. Even over the 3-mile rough stretch between Pomona and Ontario, Carlson made better than 40 miles an hour.

\$50,000 for Armored Cars in U. S. Army Appropriation Bill

WASHINGTON, D. C., Jan. 2.—The army appropriation bill, when reported to the house of representatives, will be found to contain a new item of \$50,000 for the purchase and manufacture of armored automobiles and motor trucks. This appropriation will be expended under the direction of General W. L. Crozier, chief of ordnance.

At the recent hearing before the committee there was some consultation with Gen. Crozier when he appeared before the house committee on appropriations. It appears that there is at present under construction a vehicle which is intended for experimental use. Gen. Crozier believes that there will be no difficulty in obtaining these motor cars in sufficient number when necessary, inasmuch as the armament and the armor will be easily and quickly obtainable, and it is believed there will be no delay in buying the chassis.

It is necessary, however, to design the armor and to determine its location, the main point being to protect the vulnerable parts of the engine. The quest of the army experts at present is in the direction of a satisfactory model, Gen. Crozier believing that several of the types now in commercial use may be easily converted to armored cars of the necessary powers of resistance to attack. The armored car is intended to carry two machine guns and eight men, including the driver. It is proposed to have three places in the car where the machine guns may be operated and so arranged that the ordnance may be shifted to meet the necessities of a particular occasion.

The results obtained with the armored car in Europe have impressed the officers as suggesting a new form of mounting ordnance, but a vehicle of this sort may not be as available in this country as it is in a Continental European war, because of the lack of roads in the United States which would render the armored car serviceable to the extent it has been evidently used abroad during the present war.

GRAND RAPIDS, MICH., Dec. 31.—The amendments to the Grand Rapids traffic ordinance, which will give the city the tennis court system of safety zones for pedestrians, has been passed by the Common Council.

French Factories Want Workmen

Many Automobile Makers Working Overtime on War Orders—Small Export Business Started—Touring Cars in Convoy Work—Four-Wheel-Drive Tractors in Demand

By W. F. Bradley

Special Representative of THE AUTOMOBILE with the Allied Armies in France

PARIS, Dec. 23—During the months of August, September and October there was a drop in the English automobile exports of \$1,536,340, while the imports fell \$5,910,880 during this period.

France is the greatest loser in this diminished trade. Up to the end of July the volume of business done by both England and France was considerably above the average, there being every indication that 1914 would be a record year. The first 3 months of the war, and particularly the first 2, will doubtless prove to be the most unsatisfactory for the European factories.

Workmen Needed

The declaration of war stopped all business and for a month there was complete stagnation. Gradually the factories got to work on army orders, with the result that at the present time very few firms are closed, and some are working at full pressure. The work is not uniformly spread over the industry, for certain factories produce types of cars unsuited for military purposes and have failed to secure contracts for ammunition. In France the greatest difficulty is to secure sufficient men. The army authorities are consenting to release hundreds of men in the automobile trade when it is found that they can be better employed in the factories than in the firing line. Numerous Belgian mechanics have found work in the French factories. Notwithstanding this, the cry is still for more men, and at practically all the French factories the Hands Wanted notice is constantly displayed.

As an example of the change which has come over the industry, the Darracq factory, which was practically closed during the month of August, is now running 700 men, all of them working overtime, and is increasing the staff every day. Two-thirds of these men are making shells, the remainder are producing cars to be used for ambulance work, doing army repair work, and producing a small number of cars for the foreign markets. Out of 700, Delage had forty men left when mobilization was completed. The force is now 500 strong, working 7 days a week and 12 to 14 hours a day. There was a big stock of cars in hand when the war broke out, but as orders have been placed by the French and Belgian governments for light trucks and ambulances, the number of chassis in hand is now very small. In addition to cars, big quantities of shells and aeroplane arrows are being produced. All the heads of departments, including Chief Engineer Michelat, have been released for army service in order to keep the factory running.

Active on Tractors

Panhard is working at full capacity on trucks, four-wheel-drive tractors, touring car chassis to be used as light transports, and a certain amount of private car work. Certain sections of the works are under military orders, the directors of the company being employed at the factory under direct military control. Renault is specializing in four-wheel-drive

tractors, armored cars, and trucks. Other firms producing large numbers of trucks for the French army are Saurer, Delahaye, Berliet, Aries, Bayard-Clement, Mors, Latil, and DeDion Bouton.

Very satisfactory prices are being obtained for army contracts. In some cases firms having held back their stock of touring car chassis have now been able to sell them for light convoy or ambulance work at an increase of 15 per cent on ordinary rates. It is maintained that this increase is justified by reason of the higher cost of raw material. At any rate, the army does not object to paying the higher amount.

No Private Trucks

Requisitions of private trucks stopped 10 days after the declaration of war, when there were no more trucks left in private service. Since then the army has been getting its supplies direct from the factories. In Paris, as well as in many other districts of France, the requisition of private cars has stopped, for it is found that the factories can meet the demands, and the service given by cars coming direct from the works is more satisfactory than that of vehicles taken straight out of private service. At the outbreak of the war cars had to be secured at a moment's notice, and the only possible plan was for private cars to be taken. Now that it is a question of maintaining the numbers, or of gradually increasing to meet the shortage of horses, deliveries of series of cars from the factories is obviously much more suitable than the taking of individual cars from the private owner. The method of requisitioning was for owners to be informed by means of placards that their cars must be presented. At the outbreak all machines had to be presented, and most of them have been enough voluntary presentations of cars to meet them were taken. Since the first few weeks of the war there all requirements. A general scale of payment is arranged in advance, but a certain amount of latitude is allowed the officer in charge of the operations.

Tire Factories Busy

There is plenty of activity in the tire factories. Michelin, Bergougnan and Goodrich have their solid tire sections under military control, and produce exclusively for the army authorities. Immense stocks of pneumatics have been requisitioned in the Michelin, Dunlop, Continental, Goodrich and Bergougnan factories, but there is no direct interference with the supply of pneumatic tires to private customers, providing army orders are given preference.

The Continental Tire Company's factory, near Paris, was seized by the French government some weeks ago, but the works are now running under the direction of a government manager and for the benefit of the army. The machinery put into force is that of a receivership. Whether the factory will finally be wound up and the proceeds handed over to the company, whether it will be transformed into a French company, or whether the whole will be seized remains to be seen. There are literally thousands of German firms in France

being run under the same conditions at the present time; when peace conditions are discussed it will be decided what shall be done with these businesses. The number of automobile and kindred firms seized is not particularly high. It comprises Continental, Bosch, Mea magnetos, Mercedes show rooms and factory, and such German agencies as Benz, Opel, Horsch, Mathis, and some of the ball-bearing makers' agencies.

Workmen Scarce

The heads of the various automobile factories are now faced with the problem of getting enough men to execute the orders they have in hand. Practically all the work has come from the French and Belgian army authorities. Big orders have been placed for commercial vehicles; the factories specializing in trucks have never been slack, but they are now busier than at any period since the outbreak of the war. A big use is also being made of touring car chassis as light trucks. Many of these orders are for the Belgian government, for this nation has long made use of private car chassis for transporting goods.

The French, however, are also finding the value of 16-horsepower chassis, fitted with pneumatic tires, carrying a covered platform body, and capable of moving one-half-ton loads. These are the ordinary touring car chassis with rather heavier springs, a bit lower gearing and less inclined steering column. Convoys of ten or twelve vehicles of this type, all of one make and equally loaded, can travel with the regularity of a train, bringing goods forward with greater rapidity than is possible with ordinary trucks.

Factories Make Shells

The greatest amount of work, however, undertaken by the French automobile factories is the making of shells, gun fittings and aeroplane darts. As all the factories are within a radius of 3 miles of the city of Paris, they are very conveniently situated for this work. Renault, DeDion Bouton, Darracq, Unic, Delage, Delaunay-Belleville are particularly busy on this class of work, some of these firms having received an unlimited order and many of them aiming to turn out 1,000 shells a day.

The greatest demand is for lathe men, although there is also plenty of work for the hardening departments. Every available man is snapped up as soon as he is liberated from military obligations. In certain cases machinists are set free from military duties in order to work in the factories. Government inspectors see to it that these men are actually employed on army work, and not on the private business of the company. When men are released from the army they have to return to the factory originally employing them. Others released because of some physical infirmity unfitting them for service in the field, are free to work where they wish, and in order to secure such men the automobile factories are increasing the rate of pay.

France Is Exporting

There is also a certain development in the passenger car situation. Although there is still an official restriction on the exportation of automobiles, the authorities are now allowing cars to go out of the country when not required for military purposes. One cross-channel route to England is working regularly on this class of transportation. The result is that cars are being sent to England and then shipped abroad to various destinations. The volume of business is not great, but it is as much as the factories can handle with their present limited staffs. It appears that orders for high-grade cars were not generally cancelled by customers outside Europe and deliveries are now being made after a 3-months' delay.

New Paris Buses

There is an important order awaiting the French factories for the replacement of the 1,100 motor buses taken off the

Paris streets when war broke out. The new design for these buses has been approved, and comprises a number of body changes, but very few modifications in the chassis. This order cannot be given out to foreign firms, and as the factories capable of executing it are too busy with army production, it is being made to stand over until a more convenient moment. In the meantime Parisians have to find other means of locomotion.

The knowledge that automobile orders have gone to American firms does not worry French automobile manufacturers. It is recognized that if orders have been sent abroad it is because they cannot be executed at home, and that the arrival of these vehicles will not have any influence on the normal trade of the country under peace conditions. If America can help to make up the French and Russian deficiencies, there is also the possibility that she may attempt to do the same for Germany.

French Repair Departments

The repair departments of all the French automobile factories are working under high pressure. There are hundreds of touring cars which have covered 200 miles for 100 consecutive days. Some have done more, for it must be remembered that army cars travel as much by night as by day, and are only held up to allow the driver to obtain food and sleep. An unskilled or rough driver will probably wreck his machine under such conditions. A clever driver will keep his car going all the time, but at the end of 20,000 miles it will have need of a factory visit. It is on such work that the repair departments are now busy. Drivers obtain 2 or 3 days' leave of absence in order to make a quick trip to Paris and there have the repair work carried out with the least possible delay. As all the work is of an urgent nature, some of the factories have made arrangements to keep staffs ready for night and Sunday work.

Tire economy is not considered at the present time. Shoes are run until they burst, then left on the roadside. Partly worn casing which under ordinary circumstances would be carried on the car until they could be given to the repair department are thrown away for lack of carrying capacity and for lack of a tire repair department to treat them.

Another of the little wastages is gasoline and oil tins. French gasoline is delivered in 1-gallon tins, and English gasoline in 2-gallon vessels. Every driver carries from 1 to 10 of these cans on his car as a reserve supply, and as he has no means of refilling them, he almost invariably throws them away. As each can is worth 15 cents, the wastage, multiplied by thousands, would be considered important in times of peace; under war conditions it is negligible.

Boillot Too Daring for French General

NEW YORK CITY, Jan. 4—According to a cable to the *New York Times*, Gen. Joffre has selected a new chauffeur, a reservist named Edmond Théodore from Niort, who passed his conscript service as a naval mechanic. His former driver was Boillot, the famous racing driver, whose eagerness to gratify the General's fondness for speed caused him to take unnecessary risks. After one particularly hairbreadth escape Gen. Joffre, without reproaching Boillot, quietly announced his intention of making a change, not owing to the danger, but because Boillot's daring swerves kept him awake.

SEATTLE, WASH., Dec. 31—An automobile holding company that will engage in the selling of used cars on an elaborate scale on the Pacific Coast is now being formed by L. H. Rose, formerly connected with the Studebaker and Lozier factories on the Pacific Coast, and Paul Smith, former sales manager of the Studebaker Corp. The company is to be incorporated with a capital stock of \$50,000 and will act as a holding company for a chain of stores along the entire Pacific Coast from Seattle to Bakersfield, Cal. Headquarters will be established in San Francisco.

Miscellaneous Items of the Industry

Pennsylvania Fees Total \$1,085,039.50

HARRISBURG, PA., Jan. 2—Automobile licenses netted the state of Pennsylvania \$1,085,039.50 for the year 1914. The statement of licenses just issued shows that 106,401 pneumatic tired cars were licensed; 6,453 solid tire machines; 1,176 tractors and 118 trailers. Over 52,000 drivers and operators received licenses and 3,579 dealers were given privilege to operate cars pending sale. Thus far 30,000 pneumatic tired vehicles and 3,500 solid tire machines have been licensed for 1915.

DES MOINES, IA., Jan. 2—The revenue of the state of Iowa from motor cars during the year 1914 was \$1,025,000 and the total number of automobiles registered was 106,000. This was the announcement of the state motor vehicle department at the end of 1914. It is expected that the automobile registration in Iowa will pass the 130,000 mark this year. Receipts in the state department are now running over \$10,000 a day.

Northway to Show Eight at Chicago

DETROIT, MICH., Jan. 4—Keeping step with the public demand the Northway Motor & Mfg. Co., Detroit, Mich., is preparing to place on the market an eight-cylinder motor of the already well-known V-form. The decision of the company follows experimenting over a considerable period. The first motor which will have cylinders measuring 3 1-2 by 4 1-2, giving an S. A. E. horsepower rating of 39.2, will be exhibited at the National Automobile Show in Chicago during the week January 22 to 30.

To Build 500 Twombly Taxicabs

NEW YORK CITY, Jan. 2—The Twombly 20-cents-a-mile, two-passenger taxicab which it had been planned would be placed in service here January 1 by a cab company will not appear on the streets until March 15 and then under the management of W. Irving Twombly, the maker. He has formed the Twombly Taxicab Co. with \$300,000 capitalization under the New York laws and is preparing to build 500 cabs. About twenty-five of these will be ready for service March 15. He has also added a cab which will carry four passengers and will build on the proportion of 80 per cent. for two passengers and 20 per cent. for four passengers. The rates will be: two passengers, 25 cents the first mile and 5 cents a quarter thereafter. Four passengers, 30 cents the first mile and 7 cents a quarter thereafter.

1915 Buick Averages 21.75 M. P. G.

SEATTLE, WASH., Dec. 31—In an unofficial combined speed, economy and endurance test, between Seattle and Vancouver, B. C., on December 24, a 1915 model 25 Buick touring car carrying five passengers covered the 174 miles in 6 hours and 15 minutes and the round trip in 14 hours and 4 minutes. Only 16 gallons of gasoline were consumed on the round trip, an average of 21.75 miles to the gallon.

LANSING, MICH., January 2—Each of the 2,400 men and women, from the office boy and the telephone girl to the heads of the various departments, of the Reo Motor Car Co., and the Reo Motor Truck Co., were given a \$5 gold coin as a New Year's present.

In former years the employees received a part of the profits, based upon their annual wages. This form of distribution has not proven satisfactory, because it could not, owing to the general industrial conditions, result in a fair appropriation for each employee, some departments closing part of the year during the dull season, while in others men were temporarily laid off.

Lincoln Highway Decoration for Detroit Show

DETROIT, MICH., Jan. 1—To this city or rather to the Detroit Automobile Dealers' Assn., will go the credit and honor of presenting in connection with the annual automobile shows one of the most attractive new decoration schemes. There will be several different decorative schemes, as a matter of fact, but the principal one will be the Lincoln Highway which will be shown from coast to coast in a series of forty panels of about 18 by 14 feet and which will represent the most interesting and picturesque scenes in every state along the

famous highway. This will be the decoration of the main passenger car showroom, in the second and larger one of the two show buildings.

The first building will house the commercial cars and trucks. From the truck building to the passenger car building the visitor will have to go through a 30-foot passage which will be put up in the shape of a grotto.

The first floor of the pleasure car show will be a Japanese garden in which red and mahogany will predominate. On the next floor will be the Lincoln Highway.

NEW YORK CITY, Dec. 31—The vehicle equipment department of the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., is opening sales-service locations in this city, Cleveland, Detroit, Chicago and Indianapolis. It will probably open similar stations on the Pacific Coast. In New York City, the station is at 250 West Fifty-fourth street; in Cleveland, at 2025 Euclid avenue; Detroit, on Woodward avenue; Chicago at 2007 Michigan avenue and in Indianapolis at 427 North Meriden street.

Germany Using Castor Oil as Lubricant

BERNE, SWITZERLAND, Dec. 28—German agents are attempting to procure castor oil from neutral countries. Germany requires this especially for oiling the motors of aeroplanes and motor cars which are used in very low temperatures.

74,906 Fords in Past 4 Months

DETROIT, MICH., Dec. 31—The Ford Motor Co., reports that in the 4 months ending November 30 there were 74,906 Ford cars sold and delivered. This demonstrates quite conclusively that the tremendous Ford schedule of 300,000 cars for the year is being maintained.

Cleveland Spends \$1,000,000 on Cars

CLEVELAND, O., Jan. 2—Cleveland owns \$1,000,000 worth more automobiles this year than it did in 1913, according to the tax returns compiled by County Auditor Zangerle. The average value of automobiles returned for taxation was \$796. The total return for this year amounts to \$5,790,000 as against \$4,946,000 a year ago.

Keeton Continues Four-Cylinder Model

BRANTFORD, ONT., Jan. 2—Keeton Motors, Ltd., will continue its 35-horsepower, four-cylinder chassis for 1915. The car has a Northway power plant, Delco starting, lighting and ignition; Salisbury axles, the rear one floating, and is equipped with Hyatt roller bearings. It has a V-shaped radiator and wire wheels and has left drive and center control. It is furnished only as a five-passenger touring car, finished in real leather, and provided with mohair top and complete equipment. It sells at \$1,390 in Canada. Until 1913 the company marketed a six-cylinder, 48-horsepower model, which was superseded by the present one for 1914.

Lee Oldfield Has Ten-Cylinder Racer

MINNEAPOLIS, MINN., Dec. 31—Lee Oldfield, the racing driver, has under construction here a racing car with ten-cylinder, two-cycle rotary motor of the aeroplane type with 3-inch bore and stroke and air cooling. Piston displacement is 210 cubic inches on this basis, or well within the 300-inch limit. Plans were drawn several months ago and the motor parts have been completed. The engine is to be assembled soon and then tests will start. It is planned to keep the car within 10 pounds of the A. A. A. limit of 1,600 pounds for racing cars.

NEW YORK CITY, Jan. 4—The taxicab companies in this city have lost their fight for a private taximeter rate as against the legal fare set by the Aldermen today, when Mayor Mitchel approved the amendment to the ordinance putting every vehicle operating with a meter under the public hack law.

The terms of the amendment mean that the owners must either operate the meters at the legal rate or take the meters off their machines if they wish to charge more.

Factory Miscellany

THREE Buildings for MotoKart—Plans for The MotoKart Co.'s new shop at Scranton, Pa., show three manufacturing buildings numbers one, three and four, two of them 60 by 300, one 60 by 260, and each three stories in height; a power plant 40 by 80 and a three-story storage and administration building 60 by 250, a total of over 200,000 square feet area, approximately 5 acres under roof. While foundations and supporting columns are planned for three stories, it is the company's intention to erect each building two stories in height before adding the third, this so as to earlier carry out the planned sequence of manufacturing operation. Building No. 1 now being erected will ultimately become the company's general machine shop, all parts of the car being manufactured therein and transferred via bridge passages to the second floor of building No. 3, which will be known as the unit assembly department, and where individual parts will be grouped to form motors, axles, steering gears, etc., the finished units being delivered to the lower floor of the same building, which will be the chassis assembly room. The progress of the chassis construction will be towards the

rear of the plant, the finished chasses crossing an open court to the floor of building No. 4, the general assembly department, bodies being manufactured in the upper floor of the same building. The routine of manufacture as planned is one calculated to insure continuous progress of material and the lowest minimum of productive cost. Differing somewhat from many up-to-date plants, where perhaps centralization has been carried out to an extreme, each of the three manufacturing buildings of The MotoKart Co.'s plant will constitute an independent unit, having its own store-room, lavatories, employees' entrance, etc., and receiving needed materials direct through the open courts dividing these buildings. Detailed plans have now practically been completed, and building No. 1 should be under roof by March 15.

Firestone Uses 24,000,000 Pounds Steel—The Firestone Tire & Rubber Co., Akron, O., used 24,000,000 pounds of steel last year in the manufacture of its rims. The storage of the raw steel required 15,386 square feet of floor space. A force of 400 men and a working floor space of 150,000 square feet are used in the rim plant. There are sixteen electric weld-

ers, one of them specially constructed to handle stock 14 inches wide. Sixty automobile manufacturers will use Firestone rims during the coming year.

Takes Over Columbia Car Plant—Alterations are now in progress at the former plant of the Columbia Motor Car Co., Hartford, Conn., acquired by the Billings & Spencer Co. For some time past the Billings & Spencer Co. has been putting the works in shape looking towards ultimate occupancy. Because of the general objection to the forge department of the company, at present located in a residential section, the move of this portion of the present plant to the new quarters is logical. These have been materially improved. In fact, the original two forging departments of the Columbia plant are being remodeled into one approximately 350 feet long and 80 feet wide. The old roof is being replaced by a steel affair. A machine department is to be installed in the north wing and the head room increased. Under the improvement plan a new boiler house is to be built. Structural steel is being liberally used throughout the building. Large cranes, capable of carrying about twenty tons, are to be installed. The alterations will cost about \$100,000.

The Automobile Calendar

Jan. 2-9.....New York City, Annual Automobile Show, Grand Central Palace.
Jan. 2-9.....New York City, Automobile Salon, Grand Ball Room of Astor Hotel, Automobile Importers' Alliance, E. Lascaris, Pres.
Jan. 3-10.....Buenos-Aires, Argentina, Grand Prize of Argentina.
Jan. 7-9.....Pasadena, Cal., Show, Hotel Maryland Amphitheater.
Jan. 8-14.....Milwaukee, Wis., Show, Auditorium, Milwaukee Auto. Dealers' Assn.
Jan. 9.....San Diego, Cal., Road Race.
Jan. 9-16.....Philadelphia Show, Metropolitan Bldg., Philadelphia Auto. Trade Assn.
Jan. 11-16.....Buffalo, N. Y., Show, Broadway Auditorium, A. C. of Buffalo.
Jan. 16.....Detroit, Mich., Show.
Jan. 16-23.....Cleveland, O., Show, Cleveland Automobile Show Co., F. H. Caley, Mgr.
Jan. 18-23.....Rochester, N. Y., Show, Exposition Park, Rochester Auto Trades Assn.
Jan. 20-28.....Lancaster, Pa., Hiemenz Auditorium.
Jan. 23-30.....Montreal, Que., Show, Allen Line Liverpool Bldgs., Montreal Automobile Trade Assn., T. C. Kirby, Mgr.
Jan. 23-30.....Portland, Ore., Show.
Jan. 23-30.....Chicago, Ill., Automobile Show, Coliseum and First Regiment Armory.
Jan. 25-30.....Fall River, Mass., Show.
Jan. 25-30.....Buffalo, N. Y., Show, Broadway Auditorium, Buffalo Automobile Dealers' Assn.
Jan. 28.....New York City, S. A. E. Met. Section Meeting; Report Research Com. on Greases. Supplementary subject: Asphalt vs. Paraffin base lubricants.

Jan. 30-Feb. 6....Columbus, O., Show, Memorial Hall, Columbus Auto Club and Columbus Auto. Trades Assn.
Jan. 30-Feb. 6....Minneapolis, Minn., Show, National Guard Armory, Minneapolis Automobile Trade Assn.
Feb.....Portland, Ore., Show, Portland Auto Trade Assn.
Feb.....Toledo, O., Show, Toledo Auto Show Co.
Feb. 1-6.....Louisville, Ky., Show, Louisville Auto. Dealers' Assn., First Regiment Armory.
Feb. 4-6.....Marquette, Mich., Show, Dealers Assns. of Marquette and Menominee.
Feb. 2-7.....Kalamazoo, Mich., Show, Armory.
Feb. 8-13.....Toledo, O., Show, Terminal Bldg., Toledo Auto. Shows Co., H. W. Blevins.
Feb. 8-14.....Kansas City, Mo., Show.
Feb. 9-12.....Eau Claire, Wis., Eau Claire Auto. Dealers' Assn.
Feb. 9-12.....Peoria, Ill., Show, Peoria Auto & Motor Cycle Dealers.
Feb. 15-20.....Grand Rapids, Mich., Show, Klingman Furniture Exposition Bldg., Grand Rapids Herald; C. L. Merriman.
Feb. 15-20.....Omaha, Neb., Show, Auditorium, C. G. Powell.
Feb. 15-20.....Bridgeport, Conn., Show, State Armory; B. B. Sterber.
Feb. 22.....San Francisco, Cal., Vanderbilt Cup Race, Panama-Pacific Exposition Grounds; Promoter, Panama-Pacific Exposition Co.
Feb. 23-27.....Syracuse, N. Y., Show, Syracuse Auto Dealers' Assn.; H. T. Gardner, Mgr.
Feb. 23-27.....Ft. Dodge, Ia., Show, Armory, C. W. Tremain, Sec.

Feb. 25.....New York City, S. A. E., Metropolitan Sec. Meeting; Report of Research Committee on Kerosene Carbureters. Research Com. Report on Non-Electric Continuous-Torque Transmission.
Feb. 27.....San Francisco, Cal., Panama-Pacific Exposition, Grand Prize Race, Panama-Pacific Exposition Grounds; Promoter, Panama-Pacific Exposition Co.
Mar. 6-13.....Boston, Mass., Show, Mechanics Bldg., Boston Auto Dealers Assn., Boston Commercial Motor Veh. Assn.
Mar. 6-13.....New York City, Made In the U. S. A. Exhibition, Grand Central Palace.
Mar. 8-13.....Canton, O., Show, Auditorium, Stark Co. Auto. Show and Electrical Exposition.
Mar. 8-13.....Des Moines, Ia., Show, C. G. Van Vliet.
Mar. 14.....San Francisco, Cal., Panama-Pacific Cup Race, Panama-Pacific Exposition Grounds; Promoter, Panama-Pacific Exposition Co.
Mar. 17.....Venice, Cal., 300-Mile Road Race.
April.....Calumet, Mich., Show, Coliseum.
May 17-18.....Boston, Mass., A. A. A. Annual Meeting.
May 29.....Indianapolis, Ind., 500-Mile Race, Indianapolis Motor Speedway.
June 9.....Galesburg, Ill., Two-mile Track Meet.
June 16.....Chicago, Ill., Speedway, 500-Mile Race, Speedway Park Assn.
June 25.....Sioux City, Ia., Track Meet.
July 4.....Tacoma, Wash., Road Race.
Aug. 20-21.....Elgin, Ill., Road Race.
Sept. 20-25.....San Francisco, Cal., International Engineering Congress.

The Week in the Industry



Motor Men in New Roles

VELIE Makes Important Changes—The board of directors of the Velie Motor Vehicle Co., Moline, Ill., as well as of the Velie Engineering Co. have elected R. R. Bush, formerly sales manager, to the office of manager, and, as the title implies, he will have full charge over the entire affairs of both concerns hereafter. G. H. Lloyd is placed in charge of sales, filling the office made vacant by the advancement of Mr. Bush while W. H. Morgan continues in sales jurisdiction over the trade in Illinois, Iowa and Wisconsin. H. T. Wheelock assumes charge of the advertising department in addition to his affiliation with motor truck sales.

Hart Manager—J. T. Hart is general manager of the Auto Parts Co., Chicago, Ill.

Heath Sales Manager—C. B. Heath has been appointed general sales manager for the Bantam Anti-Friction Co., Bantam, Conn., with headquarters at the factory.

Trumbull President Hartford Auto Parts—J. H. Trumbull has been elected president of the Hartford Auto Parts Co., Hartford, Conn. James Carney has been elected treasurer of the company.

Wheeler Makes Change—T. Wheeler, who was district sales manager of the Chalmers Motor Co., Fort Worth, Tex., is now general manager of the Bryant Machinery Co., that city, which will handle the Chalmers car.

Harper Heads Newark Truck Club—David Harper was unanimously chosen president of the recently organized Motor Truck Club of New Jersey at a meeting held last week at the clubhouse of the New Jersey Automobile and Motor Club, Newark, N. J.

Smith Heads Brooklyn Lexington—The Lexington Sales Co., Inc., with warerooms and service stations at 1174 Bedford avenue, Brooklyn, N. Y., has been formed with A. T. Smith at the head and M. J. Swetland as business and financial manager.

Kramer Severs Overland Connections—F. W. Kramer, of Grand Rapids, Mich., formerly manager of the Grand Rapids Overland Co., has severed all connections with that concern in order to devote his time to his other interests. Mr. Kramer left in December for a vacation trip.

George Resigns—C. A. George, for 4 years in the export sales department of the Willys-Overland Co., Toledo, O., has resigned, and has become export manager for the O.K. Light Delivery Truck Co., Detroit. He has left for England, where he will establish his European headquarters for the present.

Boulden Chase Sales Manager—H. T. Boulden assumed the general sales managership of The Chase Motor Truck Co., Syracuse, N. Y., on January 4. Mr. Boulden will have entire charge of selling and in addition will look after all advertising. E. A. Kingsbury continues as secretary and treasurer, while Mr. Chase,

who has had charge of sales, will devote his entire time to the manufacturing and production end of the business.

Reeves Pilot Representative—J. F. Reeves, formerly of Dallas, Tex., has been appointed California representative for the Pilot car, with headquarters at San Francisco, and will establish agencies in the territory north of Bakersfield. The Wilshire Automobile Co., Los Angeles, will control the southern portion of the State.

Ris Heads N. Y. Knight Tire—L. I. Ris, who for the past year has been a traveling sales representative for the Republic Rubber Co., in New York State and Connecticut, has been appointed manager of the New York City branch of the Knight Tire & Rubber Co., Canton, O., which is just being opened at 215 West Fifty-first street, New York City. Mr. Ris was formerly connected with the Century Tire Co., in charge of its Buffalo branch, and worked under the direction of H. J. Woodard, general manager of that company. Mr. Woodard is now eastern district manager of the Knight Co., and will direct the operation of the Knight branches in Boston, New York, Philadelphia and Baltimore.

Garage and Dealers' Field

Mutty Moves in Boston—The L. J. Mutty Co., Boston, Mass., has moved to 175 Congress street.

Opens Delaware Tire Agency—With C. C. Matthews as manager, a local sales branch of the Delaware Tire Sales Co. has been opened at 15 West North street, Indianapolis, to sell Delaware tires in Indiana.

Hartford Pierce-Arrow Service Station—S. A. Miner, Pierce-Arrow distributor for northern Connecticut, has opened up a fully equipped service station at 105 Albany avenue, Hartford, Conn. The building has just been completed.

Columbus Kissel Enlarges Territory—The Kissel Service Co., 241 North Fourth street, Columbus, O., recently organized with C. G. McCune as general manager, has taken the agency for the KisselKar in seventeen counties in central Ohio. Sub-agencies will be established later.

Polack Tire in Motor Mart—The Polack Tire & Rubber Co. has leased the store at 10 West Sixty-second street, New York City, in the Motor Mart, with 7,500 square feet of basement space, the rear portion of the second floor for its executive offices and the large electric sign on the roof.

Prohibits Gasoline for Washing—Safety Director Holmes of Cincinnati, O., has given orders prohibiting the use of gasoline in the washing of cars. A number of fires have recently taken place through the use of gasoline in that manner. Director Holmes suggested that coal oil, which is not as volatile as gasoline, be used.

Fire Destroys Lancaster Garage—The Overland Garage, located on West Main street, Lancaster, O., owned by L. E.

Huddle, was completely destroyed by fire recently, entailing a loss of approximately \$80,000. In all about sixty cars of all kinds were burned. The garage caught fire through the back fire on an engine, and a number of gasoline explosions occurred. In all ten new cars were saved from the flames.

Los Angeles Co. Enlarges—The Carlton-Faulkner-Bowles Co., Los Angeles, Cal., has taken over the large building on Eleventh and Flower streets, formerly occupied by the Thomas Motor Car Co., having outgrown the location on Tenth and Hope streets. The annex is to be used as a salesroom for Jeffery trucks and as a service depot for the Fiat, McFarlan and Jeffery pleasure cars handled at the agency's old location.

Gets Out Automatic Salesman—The Standard Woven Fabric Co., Framingham, Mass., has gotten out a handy brake lining cabinet which is called the Automatic Salesman. Each cabinet is built so as to hold 700 feet of brake lining, each roll having a separate compartment and revolving on a separate axis, so that the desired quantity can be easily rolled off at any time. Another innovation is the marking of its goods with plain white lines at intervals of exactly 1 foot.

Remy Acquires Detroit Location—H. W. Griffith, general manager of the Remy Electric Co., Anderson, Ind., closed a deal last week involving the purchase of a tract on East Grand boulevard, Detroit, near the Packard Motor Car Co.'s plant, having a frontage of 500 feet on the boulevard and a depth of 150 feet. A building to house the engineering, experimental laboratories and drafting departments, as well as Detroit branch and service station, with about 20,000 feet floor space, three stories high, will be erected at once and will probably be ready for occupancy in between two and three months, at which time the departments mentioned above will be moved from the main plant at Anderson, Ind.

Changes in Philadelphia—Before or during the Philadelphia Show Week, January 9 to 16, several motor car companies will indulge in a general shifting of locations, more changes taking place than ever before during a similar period. The Lee Tire & Rubber Co., now located at 334 North Broad street, will remove to 660 North Broad street. The Colonial Motor Co., 330 North Broad street, local distributors of the R. C. H. and the Partin-Palmer cars, goes to 664 North Broad street. The properties 334-336 North Broad street will be made into one, the enlarged building to be the home of the Chevrolet; 336 North Broad street is at present occupied by the Hupmobile, but the Hupp company will remove two doors below, 332. The Johnson Motor Car Co., handling the Haynes and Saxon, is to occupy the present quarters of the Overland car, 132-134 North Broad street. The Overland company having leased the building at the northeast corner of Broad and Wood streets, the old Fiat headquarters. The Fiat company has already removed to Chestnut street, west of Eighth.